



The Printer Working Group

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Working Draft

PWG MFD Alerts v1.1 (MFD Alerts)

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Abstract: This document defines an update to the IANA-PRINTER-MIB (originally published in RFC 3805) to provide support for SNMP alerts in a multifunction device (MFD) and an equivalent update to IPP "printer-state-reasons" [STD92] and IPP "printer-alert" [PWG5100.9].

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

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61 Contact information:

62 The Printer Working Group
63 c/o The IEEE Industry Standards and Technology Organization
64 445 Hoes Lane
65 Piscataway, NJ 08854
66 USA
67

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125 **1. Introduction**

126 This document defines simple extensions to the originally printer-specific IETF Printer MIB
127 v2 [RFC3805] (new enumeration values in prtAlertCode) and IETF IPP/1.1 [STD92] (new
128 keyword values in “printer-state-reasons”) to add support for alert information for
129 multifunction devices (MFDs), which are now very popular alternatives to using separate
130 printer, copier, and facsimile equipment. Prior to the introduction of MFDs, printer vendors
131 and application developers had already created tools, management systems, and device
132 drivers based upon the Printer MIB v2 [RFC3805] and the prtAlertTable. MFDs are
133 typically less expensive than an equivalent set of individual devices, and have the
134 additional advantage of occupying much less office space.

135 The printer portion of an MFD is used by the print, copy, and facsimile (fax) functions.
136 Additional scanner and scan media path components are used by the copy and fax
137 functions. The fax function also uses a fax modem component with a PSTN interface.

138 The Printer Working Group (PWG) developed the IETF Printer MIB v2 [RFC3805], which is
139 now implemented in most network printers sold today and defines the prtAlertTable that
140 may be used, with or without SNMP traps, to implement an effective warning and error
141 reporting system.

142 **2. Terminology**

143 **2.1 Conformance Terminology**

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

149 **2.2 Printing Terminology**

150 Normative definitions and semantics of printing terms are imported from IETF Printer MIB
151 v2 [RFC3805], IETF Finisher MIB [RFC3806], and IETF Internet Printing Protocol/1.1:
152 Model and Semantics [STD92].

153 *Document*: An object created and managed by an IPP Printer that contains the description,
154 processing, and status information. A Document object may have attached data and is
155 bound to a single Job.

156 *Job*: An object created and managed by an IPP Printer that contains description,
157 processing, and status information. The Job also contains zero or more Document objects.

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

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

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

164 **2.3 Protocol Role Terminology**

165 This document also defines the following protocol roles in order to specify unambiguous
166 conformance requirements:

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

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

172 *SNMP Printer*: Listener for incoming SNMP Get and Set management requests and
173 sender of optional outgoing SNMP notifications for a Printer or MFD.

174 *SNMP Client*: Initiator of outgoing SNMP Get and Set management requests and receiver
175 of optional incoming SNMP notifications for a Printer or MFD (i.e., an SNMP Manager).

176 **2.4 Other Terminology**

177 *Capitalized Term In Italics*: definition of the term with any references as appropriate.

178 **2.5 Acronyms and Organizations**

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

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

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

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

183 **3. Requirements**

184 **3.1 Rationale**

185 The IETF, and PWG standards in the printing industry include:

- 186 1. An abstract model of a PrintDevice in section 2.2 of the IETF Printer MIB v2
187 [RFC3805].
- 188 2. An SNMP Alert table for a PrintDevice to support the service and maintenance
189 functions in section 2.2.13 of the IETF Printer MIB v2 [RFC3805].
- 190 3. A set of design goals for status monitoring in a printing protocol in section 3.1.3
191 “Viewing the status and capabilities of a printer” (for End User), section 3.2.1
192 “Alerting” (for Operator), and section 3.3 “Administrator” (the bullet requirement to
193 “administrate billing or other charge-back mechanisms”) of the IETF IPP Design
194 Goals [RFC2567].
- 195 4. A set of MFD service types for Imaging Systems in the JmJobServiceTypesTC
196 textual convention in section 4 of the IETF Job Monitoring MIB [RFC2707].
- 197 5. An abstract model of an MFD job in section 2 of the IETF Job Monitoring MIB
198 [RFC2707].
- 199 6. An abstract model of an MFD in the PWG MFD Model and Common Semantics
200 [PWG5108.1].
- 201 7. In the years since the Printer MIB v2 [RFC3805] was published printers have
202 evolved into MFDs. Prior to the introduction of MFDs, printer vendors and
203 application developers had already created tools, management systems, and device
204 drivers based upon the Printer MIB v2 [RFC3805] and the prtAlertTable. Now that
205 these same vendors are building MFDs, there is an urgent need to leverage these
206 existing tools and management applications.
- 207 8. This document defines a new set of MFD alert groups and MFD component alerts
208 that will allow the applications currently using the prtAlertTable to support MFDs.

209 3.2 Use Cases

210 Provide use cases for the document in subsections using the casual use case format.

211 3.2.1 MFDs with OEM Components

212 Company A markets complete systems, including a full range of computers, printers, and
213 other office peripheral devices. Most of the equipment included with these systems are
214 manufactured by Company A. The remaining equipment is Company A branded (i.e.,
215 OEM), but manufactured by others. All of these systems include a management
216 application that monitors all systems components and automatically initiates service calls.

217 For printer maintenance, the management system uses the prtAlertTable. New system
218 configurations now offer MFDs as options for printers. By including the MFD Alerts in the
219 MFDs and in Company A's management system, Company A can now offer full
220 management and maintenance support for these new MFDs.

221 3.2.2 MFDs with Alert Messages

222 Company B is now adding a new series of MFDs to its extensive line of printers. The
223 current printer families include a deluxe driver that monitors the prtAlertTable to provide
224 status information to the end user. The monitor function does not interpret the prtAlertCode
225 or the prtAlertLocation values, but instead queries and displays the prtAlertDescription
226 value to indicate the fault condition. This feature allows the end user to initiate any action
227 that may be required to complete the user's jobs. The fault information may be related to a
228 job that precedes the user's current job so, if the owner of the previous job is not able or to
229 does not wish to act, the owner of the new job may take the appropriate action so that
230 normal operation can resume. By including the MFD Alerts in their new MFD family,
231 Company B can now offer the monitor function for these new MFDs.

232 3.3 Exceptions

233 There are no significant exceptions to describe for the above use cases

234 3.4 Out of Scope

235 The following are considered out of scope for this specification:

- 236 1. Definition of any components that are not already defined in the PWG MFD Model
237 and Common Semantics [PWG5108.1];
- 238 2. Definition of any semantics for workflow applications;
- 239 3. Definition of any semantics for document repositories; and
- 240 241 4. Definition of any application-specific semantics for MFD monitoring using MFD
242 Alerts.

245 3.5 Design Requirements

246 The design requirements for this specification are:

- 247 1. Define a set of alert groups to provide alert capability for MFDs equivalent to the
248 capability currently provided for printers for registration in the PRTAlertGroupTC in
249 the IANA Printer MIB [IANAPRT];
- 250 2. Define new alert groups for MFD components only where functionally equivalent
251 groups do not already exist for the PrintDevice (for example, a ScanMediaPath is
252 inherently entirely separate from any print MediaPath);
- 253 3. Do not define new alert groups for MFD components where functionally equivalent
254 groups already exist for the PrintDevice (for example, ScanDevice covers should be
255 modeled using the existing Cover group);

- 256 4. Define a set of component-specific alerts for new ScanDevice and FaxDevice
 257 components for registration in the PrtAlertCodeTC in the IANA Printer MIB
 258 [IANAPRT]; and
- 259 5. Define a set of component-specific extension alerts for existing Input, Output, and
 260 MediaPath alert groups that correspond to extensions for the ScanMediaPath alert
 261 group.

262 4. SNMP Printer Model Extensions

263 This section briefly summarizes extensions to the abstract SNMP Printer Model, originally
 264 defined in section 2 of IETF Printer MIB v2 [RFC3805], based on the PWG MFD Model
 265 and Common Semantics [PWG5108.1], to include the ScanDevice and FaxDevice, their
 266 additional subunits, and the new OutputChannel subunit.
 267

268 4.1 ScanDevice

269 The ScanDevice uses the following subunits: Console, Cover, Interface, Interpreter,
 270 OutputChannel, Processor, ScanMediaPath, Scanner, Storage, and optionally the
 271 VendorSubunit.

272 4.2 FaxDevice

273 The FaxDevice uses the following subunits: Console, Cover, FaxModem, Finisher,
 274 InputChannel, InputTray, Interface, Interpreter, Marker, MediaPath, OutputChannel,
 275 OutputTray, Processor, ScanMediaPath, Scanner, Storage, and optionally the
 276 VendorSubunit.

277 4.3 OutputChannel

278 An OutputChannel is the opposite of an InputChannel – it sends jobs and user data from
 279 an MFD via a configured application protocol (e.g., SMTP) to specified destinations.

280 5. MFD Alerts

281 5.1 MFD Subunit Alert Groups

282 The new MFD subunit alert groups and the associated alert group values are defined in
 283 this section for registration in PrtAlertGroupTC in IANA Printer MIB [IANAPRT].

284

Table 1: MFD Alert Groups

MFD Alert Group	PrtAlertGroupTC Value
-----------------	-----------------------

MFD Alert Group	PrtAlertGroupTC Value
scanDevice	50
scanner	51
scanMediaPath	52
faxDevice	60
faxModem	61
outputChannel	70

285 5.2 MFD Subunit Alerts

286 The new MFD subunit alerts and the associated alert values are defined in this section for
287 registration in PrtAlertCodeTC in IANA Printer MIB [IANAPRT].

288 Note: The original Printer MIB v1 [RFC1759] and subsequent Printer MIB v2 [RFC3805]
289 did not define any (Input)Channel-specific alerts. Therefore, this MFD Alerts specification
290 does not define any OutputChannel-specific alerts. The generic alerts (subunitXxx)
291 originally defined in [RFC3805] and registered in [IANAPRT] may be used for both
292 (Input)Channel and OutputChannel subunits.

293

Table 2: MFD Subunit Alerts

MFD Subunit Alert	PrtAlertCodeTC
-- Input Group	
inputMediaTrayFeedError	814
inputMediaTrayJam	815
inputMediaTrayFailure	816
inputPickRollerLifeWarn	817
inputPickRollerLifeOver	818
inputPickRollerFailure	819
inputPickRollerMissing	820
-- Output Group	
outputMediaTrayFeedError	905
outputMediaTrayJam	906
outputMediaTrayFailure	907
-- Marker Supplies Group	
markerCleanerMissing	1116
markerDeveloperMissing	1117
markerFuserMissing	1118
markerInkMissing	1119
markerOpcMissing	1120
markerPrintRibbonMissing	1121
markerSupplyAlmostEmpty	1122
markerSupplyEmpty	1123
markerSupplyMissing	1124
markerWasteAlmostFull	1125
markerWasteFull	1126
markerWasteMissing	1127
markerWasteInkReceptacleMissing	1128
markerWasteTonerReceptacleMissing	1129

MFD Subunit Alert	PrtAlertCodeTC
markerTonerMissing	1130
-- Media Path Group	
mediaPathFailure	1305
mediaPathJam	1306
mediaPathInputRequest	1310
mediaPathInputFeedError	1311
mediaPathInputJam	1312
mediaPathInputEmpty	1313
mediaPathOutputFeedError	1321
mediaPathOutputJam	1322
mediaPathOutputFull	1323
mediaPathPickRollerLifeWarn	1331
mediaPathPickRollerLifeOver	1332
mediaPathPickRollerFailure	1333
mediaPathPickRollerMissing	1334
-- Scanner Group	
scannerLightLifeAlmostOver	5101
scannerLightLifeOver	5102
scannerLightFailure	5103
scannerLightMissing	5104
scannerSensorLifeAlmostOver	5111
scannerSensorLifeOver	5112
scannerSensorFailure	5113
scannerSensorMissing	5114
-- Scan Media Path Group	
scanMediaPathTrayMissing	5201
scanMediaPathTrayAlmostFull	5202
scanMediaPathTrayFull	5203
scanMediaPathFailure	5205
scanMediaPathJam	5206
scanMediaPathInputRequest	5210
scanMediaPathInputFeedError	5211
scanMediaPathInputJam	5212
scanMediaPathInputEmpty	5213
scanMediaPathOutputFeedError	5221
scanMediaPathOutputJam	5222
scanMediaPathOutputFull	5223
scanMediaPathPickRollerLifeWarn	5231
scanMediaPathPickRollerLifeOver	5232
scanMediaPathPickRollerFailure	5233
scanMediaPathPickRollerMissing	5234
-- Fax Modem Group	
faxModemMissing	6101
faxModemLifeAlmostOver	6102
faxModemLifeOver	6103
faxModemTurnedOn	6104
faxModemTurnedOff	6105
faxModemInactivityTimeout	6110
faxModemProtocolAlert	6111
faxModemEquipmentFailure	6112

MFD Subunit Alert	PrtAlertCodeTC
faxModemNoDialTone	6113
faxModemLineBusy	6114
faxModemNoAnswer	6115
faxModemVoiceDetected	6116
faxModemCarrierLost	6117
faxModemTrainingFailure	6118

294

295 Note: SNMP Printer subunit alert codes ending in "Error" only occur when the MFD/Printer
296 is stopped.

297 5.3 IPP printer-state-reasons (1setOf type2 keyword)

298 The new MFD alert values of "printer-state-reasons" [STD92] are defined in this section for
299 registration in IANA IPP Registry [IANAIPP]. The table below defines new MFD alert
300 values of "printer-state-reasons" [STD92] and their mapping to/from new MFD alert values
301 of 'PrtAlertCodeTC' [IANAPRT] defined above in section 5.2.

302

Table 3: IPP MFD printer-state-reasons

SNMP MFD PrtAlertCodeTC	IPP MFD printer-state-reasons
-- Input Group	
inputMediaTrayFeedError(814)	input-media-tray-feed-error
inputMediaTrayJam(815)	input-media-tray-jam
inputMediaTrayFailure(816)	input-media-tray-failure
inputPickRollerLifeWarn(817)	input-pick-roller-life-warn
inputPickRollerLifeOver(818)	input-pick-roller-life-over
inputPickRollerFailure(819)	input-pick-roller-failure
inputPickRollerMissing(820)	input-pick-roller-missing
-- Output Group	
outputMediaTrayFeedError(905)	output-media-tray-feed-error
outputMediaTrayJam(906)	output-media-tray-jam
outputMediaTrayFailure(907)	output-media-tray-failure
-- Marker Supplies Group	
markerCleanerMissing(1116)	marker-cleaner-missing
markerDeveloperMissing(1117)	marker-developer-missing
markerFuserMissing(1118)	marker-fuser-missing
markerInkMissing(1119)	marker-ink-missing
markerOpcMissing(1120)	marker-opc-missing
markerPrintRibbonMissing(1121)	marker-print-ribbon-missing
markerSupplyAlmostEmpty(1122)	marker-supply-almost-empty
markerSupplyEmpty(1123)	marker-supply-empty
markerSupplyMissing(1124)	marker-supply-missing
markerWasteAlmostFull(1125)	marker-waste-almost-full
markerWasteFull(1126)	marker-waste-full
markerWasteMissing(1127)	marker-waste-missing
markerWasteInkReceptacleMissing(1128)	marker-waste-ink-receptacle-missing
markerWasteTonerReceptacleMissing(1129)	marker-waste-toner-receptacle-missing
markerTonerMissing(1130)	marker-toner-missing
-- Media Path Group	

SNMP MFD PrtAlertCodeTC	IPP MFD printer-state-reasons
mediaPathFailure(1305)	media-path-failure
mediaPathJam(1306)	media-path-jam
mediaPathInputRequest(1310)	media-path-input-request
mediaPathInputFeedError(1311)	media-path-input-feed-error
mediaPathInputJam(1312)	media-path-input-jam
mediaPathInputEmpty(1313)	media-path-input-empty
mediaPathOutputFeedError(1321)	media-path-output-feed-error
mediaPathOutputJam(1322)	media-path-output-jam
mediaPathOutputFull(1323)	media-path-output-full
mediaPathPickRollerLifeWarn(1331)	media-path-pick-roller-life-warn
mediaPathPickRollerLifeOver(1332)	media-path-pick-roller-life-over
mediaPathPickRollerFailure(1333)	media-path-pick-roller-failure
mediaPathPickRollerMissing(1334)	media-path-pick-roller-missing
-- Scanner Group	
scannerLightLifeAlmostOver(5101)	scanner-light-life-almost-over
scannerLightLifeOver(5102)	scanner-light-life-over
scannerLightFailure(5103)	scanner-light-failure
scannerLightMissing(5104)	scanner-light-missing
scannerSensorLifeAlmostOver(5111)	scanner-sensor-life-almost-over
scannerSensorLifeOver(5112)	scanner-sensor-life-over
scannerSensorFailure(5113)	scanner-sensor-failure
scannerSensorMissing(5114)	scanner-sensor-missing
-- Scan Media Path Group	
scanMediaPathTrayMissing(5201)	scan-media-path-tray-missing
scanMediaPathTrayAlmostFull(5202)	scan-media-path-tray-almost-full
scanMediaPathTrayFull(5203)	scan-media-path-tray-full
scanMediaPathFailure(5205)	scan-media-path-failure
scanMediaPathJam(5206)	scan-media-path-jam
scanMediaPathInputRequest(5210)	scan-media-path-input-request
scanMediaPathInputFeedError(5211)	scan-media-path-input-feed-error
scanMediaPathInputJam(5212)	scan-media-path-input-jam
scanMediaPathInputEmpty(5213)	scan-media-path-input-empty
scanMediaPathOutputFeedError(5221)	scan-media-path-output-feed-error
scanMediaPathOutputJam(5222)	scan-media-path-output-jam
scanMediaPathOutputFull(5223)	scan-media-path-output-full
scanMediaPathPickRollerLifeWarn(5231)	scan-media-path-pick-roller-life-warn
scanMediaPathPickRollerLifeOver(5232)	scan-media-path-pick-roller-life-over
scanMediaPathPickRollerFailure(5233)	scan-media-path-pick-roller-failure
scanMediaPathPickRollerMissing(5234)	scan-media-path-pick-roller-missing
-- Fax Modem Group	
faxModemMissing(6101)	fax-modem-missing
faxModemLifeAlmostOver(6102)	fax-modem-life-almost-over
faxModemLifeOver(6103)	fax-modem-life-over
faxModemTurnedOn(6104)	fax-modem-turned-on
faxModemTurnedOff(6105)	fax-modem-turned-off
faxModemInactivityTimeout(6110)	
faxModemProtocolAlert(6111)	
faxModemEquipmentFailure(6112)	
faxModemNoDialTone(6113)	
faxModemLineBusy(6114)	

SNMP MFD PrtAlertCodeTC	IPP MFD printer-state-reasons
faxModemNoAnswer(6115)	
faxModemVoiceDetected(6116)	
faxModemCarrierLost(6117)	
faxModemTrainingFailure(6118)	

303
304 Note 1: IPP “printer-state-reasons” ending in “error” only occur when the MFD/Printer is
305 stopped.

306
307 Note 2: FaxModem alerts for transient conditions are NOT mapped to “printer-state-
308 reasons”.

309 6. Conformance Requirements

310 6.1 SNMP Agent Conformance Requirements

311 To claim conformance to this specification, an SNMP Agent implementation for a
312 Multifunction Device:

- 313
- 314 (a) MUST implement the prtAlertTable defined in IETF Printer MIB v2;
 - 315 (b) SHOULD implement the prtAlertTable defined in IETF Printer MIB v2 [RFC3805] as
316 persistent across power cycles and hardware reconfigurations, for reliable fleet
317 management.
 - 318 (c) MUST support the MFD alert groups defined in section 5.1 of this specification
319 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the
320 corresponding functionality (e.g., scan) is supported on the MFD;
 - 321 (d) MUST support the MFD alert codes defined in section 5.2 of this specification which
322 are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT], if the
323 corresponding functionality (e.g., scan) is supported on the MFD; and
 - 324 (e) MUST encode and interpret values of the prtAlertGroup and prtAlertCode objects
325 defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer
326 MIB [IANAPRT].

327 6.2 SNMP Client Conformance Requirements

328 To claim conformance to this specification, an SNMP Client implementation that supports
329 Multifunction Devices:

- 330
- 331 (a) MUST support the prtAlertTable defined in IETF Printer MIB v2;
 - 332 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
333 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the
334 corresponding functionality (e.g., scan) is supported on the SNMP Client;
 - 335 (c) MUST support the MFD alert codes defined in section 5.2 of this specification which
336 are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT], if the
337 corresponding functionality (e.g., scan) is supported on the SNMP Client; and

- 338 (d) MUST decode and interpret values of the prtAlertGroup and prtAlertCode objects
339 defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer
340 MIB [IANAPRT].

341 6.3 IPP Printer Conformance Requirements

342 To claim conformance to this specification, an IPP Printer implementation for a
343 Multifunction Device:

- 344
345 (a) MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes
346 defined in PWG IPP Printer State Extensions [PWG5100.9];
347 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
348 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for
349 keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is
350 supported on the MFD;
351 (c) MUST support the MFD alert codes defined in section 5.2 of this specification which
352 are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT] and IANA IPP
353 Registry [IANAIPP] for keyword values in “printer-alert” and “printer-state-reasons”,
354 if the corresponding functionality (e.g., scan) is supported on the MFD; and
355 (d) MUST encode and interpret values of “printer-alert” and “printer-state-reasons”
356 according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP].

357 6.4 IPP Client Conformance Requirements

358 To claim conformance to this specification, an IPP Client implementation that supports
359 Multifunction Devices:

- 360
361 (a) MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes
362 defined in PWG IPP Printer State Extensions [PWG5100.9];
363 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
364 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for
365 keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is
366 supported on the IPP Client;
367 (c) MUST support the MFD alert codes defined in section 5.2 of this specification which
368 are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT] and IANA IPP
369 Registry [IANAIPP] for keyword values in “printer-alert” and “printer-state-reasons”,
370 if the corresponding functionality (e.g., scan) is supported on the IPP Client; and
371 (d) MUST decode and interpret values of “printer-alert” and “printer-state-reasons”
372 according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP].
373

374 7. Internationalization Considerations

375 7.1 IPP Internationalization Considerations

376 For interoperability and basic support for multiple languages, conforming implementations
377 MUST support:

- 378 • Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
379 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
380
- 381 • Unicode Format for Network Interchange [RFC5198] which requires
382 transmission of well-formed UTF-8 strings and recommends transmission of
383 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

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

387 WARNING – Performing normalization on UTF-8 strings received from Clients and
388 subsequently storing the results (e.g., in Job objects) could cause false negatives in Client
389 searches and failed access (e.g., to Printers with percent-encoded UTF-8 URIs now
390 'hidden').

391 Implementations of this specification SHOULD conform to the following standards on
392 processing of human-readable Unicode text strings, see:

- 393 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and
394 vertical
- 395 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 396 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 397 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 398 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and
399 normalization
- 400 • Unicode Collation Algorithm [UTS10] – sorting
- 401 • Unicode Locale Data Markup Language [UTS35] – locale databases

402 Implementations of this specification are advised to also review the following informational
403 documents on processing of human-readable Unicode text strings:

- 404 • Unicode Character Encoding Model [UTR17] – multi-layer character model

- 405 ~~• Unicode in XML and other Markup Languages [UNICODEXML] – XML usage~~
- 406 • Unicode Character Property Model [UTR23] – character properties
- 407 • Unicode Conformance Model [UTR33] – Unicode conformance basis

408 7.2 SNMP Internationalization Considerations

409 The SNMP MFD alert groups and alert codes defined in this document do not add any
410 internationalization considerations beyond those covered in section 8 of the IETF Printer
411 MIB v2 [RFC3805]. The MFD extensions to the IPP Printer "printer-alert" and "printer-
412 state-reasons" attributes defined in this document do not add any internationalization
413 considerations beyond covered in section 7 of IPP/1.1 Model and Semantics [STD92].

414 8. Security Considerations

415 8.1 IPP Security Considerations

416 The IPP extensions defined in this document require the same security considerations as
417 defined in the IPP/1.1: Model and Semantics [STD92].

418 Implementations of this specification SHOULD conform to the following standard on
419 processing of human-readable Unicode text strings, see:

- 420 • Unicode Security Mechanisms [UTS39] – detecting and avoiding security
421 attacks

422 Implementations of this specification are advised to also review the following informational
423 document on processing of human-readable Unicode text strings:

- 424 • Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

425 8.2 SNMP Security Considerations

426 The SNMP MFD alert groups and alert codes defined in this document do not add any
427 security considerations beyond those covered in section 9 of the IETF Printer MIB v2
428 [RFC3805].

429 9. IANA and PWG Considerations

430 9.1 Alert Groups

431 This section contains the exact registration information for IANA to update the IANA-
432 PRINTER-MIB PrtAlertGroupTC Registry [IANAPRT], according to the procedures defined

433 in the IETF Printer MIB v2 [RFC3805] section 5, to cover the new alert groups defined in
434 section 5.1 of this document. Add to PrtAlertGroupTC the following:

```
435         -- Values for the ScanDevice
436         scanDevice(50),           -- MFD Extension
437         scanner(51),             -- MFD Extension
438         scanMediaPath(52),       -- MFD Extension
439         -- Values (50) to (59) reserved for the ScanDevice
440         -- Values for the FaxDevice
441         faxDevice(60),           -- MFD Extension
442         faxModem(61),           -- MFD Extension
443         -- Values (60) to (69) reserved for the FaxDevice
444         -- Values for other common subunits
445         outputChannel(70),       -- MFD Extension
446         -- Values (70) to (79) reserved for common subunits
```

447 9.2 Alert Codes

448 This section contains the exact registration information for IANA to update the IANA-
449 PRINTER-MIB PrtAlertCodeTC Registry [IANAPRT], according to the procedures defined
450 in the IETF Printer MIB v2 [RFC3805] section 5, to cover the new alert codes defined in
451 sections 5.2 and 5.3 of this document. Add to PrtAlertCodeTC the following:

```
452         -- Input Group
453         inputMediaTrayFeedError(814),
454         inputMediaTrayJam(815),
455         inputMediaTrayFailure(816),
456         inputMediaTrayPickRollerLifeWarn(817),
457         inputMediaTrayPickRollerLifeOver(818),
458         inputMediaTrayPickRollerFailure(819),
459         inputMediaTrayPickRollerMissing(820),
460
461         -- Output Group
462         outputMediaTrayFeedError(905),
463         outputMediaTrayJam(906),
464         outputMediaTrayFailure(907),
465
466         -- Marker Supplies Group
467         markerCleanerMissing(1116),
468         markerDeveloperMissing(1117),
469         markerFuserMissing(1118),
470         markerInkMissing(1119),
471         markerOpcMissing(1120),
472         markerPrintRibbonMissing(1121),
473         markerSupplyAlmostEmpty(1122),
474         markerSupplyEmpty(1123),
475         markerSupplyMissing(1124),
476         markerWasteAlmostFull(1125),
477         markerWasteFull(1126),
478         markerWasteMissing(1127),
479         markerWasteInkReceptacleMissing(1128),
480         markerWasteTonerReceptacleMissing(1129),
481         markerTonerMissing(1130).
```

```
483      -- Media Path Group
484      mediaPathFailure(1305),
485      mediaPathJam(1306),
486      mediaPathInputRequest(1310),
487      mediaPathInputFeedError(1311),
488      mediaPathInputJam(1312),
489      mediaPathOutputFeedError(1321),
490      mediaPathOutputJam(1322),
491      mediaPathOutputFull(1323),
492      mediaPathPickRollerLifeWarn(1331),
493      mediaPathPickRollerLifeOver(1332),
494      mediaPathPickRollerFailure(1333),
495      mediaPathPickRollerMissing(1334),
496
497      -- Scanner Group
498      scannerLightLifeAlmostOver(5101),
499      scannerLightLifeOver(5102),
500      scannerLightFailure(5103),
501      scannerLightMissing(5104),
502      scannerSensorLifeAlmostOver(5111),
503      scannerSensorLifeOver(5112),
504      scannerSensorFailure(5113),
505      scannerSensorMissing(5114),
506
507      -- Scan Media Path Group
508      scanMediaPathTrayMissing(5201),
509      scanMediaPathTrayAlmostFull(5202),
510      scanMediaPathTrayFull(5203),
511      scanMediaPathFailure(5205),
512      scanMediaPathJam(5206),
513      scanMediaPathInputRequest(5210),
514      scanMediaPathInputFeedError(5211),
515      scanMediaPathInputJam(5212),
516      scanMediaPathOutputFeedError(5221),
517      scanMediaPathOutputJam(5222),
518      scanMediaPathOutputFull(5223),
519      scanMediaPathPickRollerLifeWarn(5231),
520      scanMediaPathPickRollerLifeOver(5232),
521      scanMediaPathPickRollerFailure(5233),
522      scanMediaPathPickRollerMissing(5234),
523
524      -- Fax Modem Group
525      faxModemMissing(6101),
526      faxModemLifeAlmostOver(6102),
527      faxModemLifeOver(6103),
528      faxModemTurnedOn(6104),
529      faxModemTurnedOff(6105),
530      faxModemInactivityTimeout(6110), -- DEPRECATED
531      faxModemProtocolAlert(6111), -- DEPRECATED
532      faxModemEquipmentFailure(6112), -- DEPRECATED
533      faxModemNoDialTone(6113), -- DEPRECATED
534      faxModemLineBusy(6114), -- DEPRECATED
535      faxModemNoAnswer(6115), -- DEPRECATED
536      faxModemVoiceDetected(6116), -- DEPRECATED
537      faxModemCarrierLost(6117), -- DEPRECATED
538      faxModemTrainingFailure(6118), -- DEPRECATED
```

539 **9.3 IPP Attribute Value Registrations**

540 This section contains the exact registration information for IANA to update according to the
 541 procedures defined in [STD92].

542 The registry entry will contain the following information:

```

543     Section 9 (References)
544
545     [PWG5107.3] PWG Multifunction Device Alerts, PWG 5107.3, TBD.
546         ftp://ftp.pwg.org/pub/pwg/ipp/wd
547         wd-pmpmfdalerts10-20180813.docx
548
549     Section 2 (Keyword Attribute Values)
550     Attribute Name (attribute syntax)           Reference
551     -----
552 printer-state-reasons (1setOf type2 keyword) [STD92]
553     input-media-tray-feed-error                [PWG5107.3]
554     input-media-tray-jam                       [PWG5107.3]
555     input-media-tray-failure                   [PWG5107.3]
556     input-pick-roller-life-warn                [PWG5107.3]
557     input-pick-roller-life-over                [PWG5107.3]
558     input-pick-roller-failure                  [PWG5107.3]
559     input-pick-roller-missing                  [PWG5107.3]
560
561     output-media-tray-feed-error               [PWG5107.3]
562     output-media-tray-jam                      [PWG5107.3]
563     output-media-tray-failure                  [PWG5107.3]
564
565     marker-cleaner-missing                     [PWG5107.3]
566     marker-developer-missing                   [PWG5107.3]
567     marker-fuser-missing                       [PWG5107.3]
568     marker-ink-missing                         [PWG5107.3]
569     marker-opc-missing                         [PWG5107.3]
570     marker-print-ribbon-missing                [PWG5107.3]
571     marker-supply-almost-empty                 [PWG5107.3]
572     marker-supply-empty                       [PWG5107.3]
573     marker-supply-missing                      [PWG5107.3]
574     marker-waste-almost-full                   [PWG5107.3]
575     marker-waste-full                          [PWG5107.3]
576     marker-waste-missing                       [PWG5107.3]
577     marker-waste-ink-receptacle-missing        [PWG5107.3]
578     marker-waste-toner-receptacle-missing      [PWG5107.3]
579     marker-toner-missing                       [PWG5107.3]
580
581     media-path-failure                         [PWG5107.3]
582     media-path-jam                             [PWG5107.3]
583     media-path-input-request                   [PWG5107.3]
584     media-path-input-feed-error                [PWG5107.3]
585     media-path-input-jam                       [PWG5107.3]
586     media-path-input-empty                     [PWG5107.3]
587     media-path-output-feed-error              [PWG5107.3]
588     media-path-output-jam                      [PWG5107.3]
589     media-path-output-full                     [PWG5107.3]
590
  
```

591	media-path-pick-roller-life-warn	[PWG5107.3]
592	media-path-pick-roller-life-over	[PWG5107.3]
593	media-path-pick-roller-failure	[PWG5107.3]
594	media-path-pick-roller-missing	[PWG5107.3]
595		
596	scanner-light-life-almost-over	[PWG5107.3]
597	scanner-light-life-over	[PWG5107.3]
598	scanner-light-failure	[PWG5107.3]
599	scanner-light-missing	[PWG5107.3]
600	scanner-sensor-life-almost-over	[PWG5107.3]
601	scanner-sensor-life-over	[PWG5107.3]
602	scanner-sensor-failure	[PWG5107.3]
603	scanner-sensor-missing	[PWG5107.3]
604		
605	scan-media-path-tray-missing	[PWG5107.3]
606	scan-media-path-tray-almost-full	[PWG5107.3]
607	scan-media-path-tray-full	[PWG5107.3]
608	scan-media-path-failure	[PWG5107.3]
609	scan-media-path-jam	[PWG5107.3]
610	scan-media-path-input-request	[PWG5107.3]
611	scan-media-path-input-feed-error	[PWG5107.3]
612	scan-media-path-input-jam	[PWG5107.3]
613	scan-media-path-output-feed-error	[PWG5107.3]
614	scan-media-path-output-jam	[PWG5107.3]
615	scan-media-path-output-full	[PWG5107.3]
616	scan-media-path-pick-roller-life-warn	[PWG5107.3]
617	scan-media-path-pick-roller-life-over	[PWG5107.3]
618	scan-media-path-pick-roller-failure	[PWG5107.3]
619	scan-media-path-pick-roller-missing	[PWG5107.3]
620		
621	fax-modem-missing	[PWG5107.3]
622	fax-modem-life-almost-over	[PWG5107.3]
623	fax-modem-life-over	[PWG5107.3]
624	fax-modem-turned-on	[PWG5107.3]
625	fax-modem-turned-off	[PWG5107.3]

626 10. References

627 10.1 Normative References

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629		
630		
631	[IANAIPP]	"IANA IPP Registry", IANA Registry, http://www.iana.org/assignments/ipp-registrations
632		
633	[IANAPRT]	"IANA Printer MIB", IANA Registry, http://www.iana.org/assignments/ianaprinter-mib
634		
635	[ISO10646]	"Information technology -- Universal Coded Character Set (UCS)", ISO/IEC 10646:2011
636		

637 638	[RFC3805]	R. Bergman, H. Lewis, I. McDonald, "IETF Printer MIB v2", RFC 3805, June 2004, https://tools.ietf.org/html/rfc3805
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641 642	[RFC5198]	J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange", RFC 5198, March 2008, http://tools.ietf.org/html/rfc5198
643 644 645	[RFC7230]	R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", RFC 7230, June 2014, https://tools.ietf.org/html/rfc7230
646 647	[STD63]	F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, http://tools.ietf.org/html/rfc3629
648 649 650	[STD66]	T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", RFC 3986/STD 66, January 2005, http://tools.ietf.org/html/rfc3986
651 652	[STD92]	M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", RFC 8010/RFC 8011 / STD 92, June 2018, https://tools.ietf.org/html/std92
653 654 655	[UAX9]	Unicode Consortium, "Unicode Bidirectional Algorithm", UAX#9, May 2018, http://www.unicode.org/reports/tr9/
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700 11. Author's Address

701 Ira McDonald
702 High North Inc
703 PO Box 221
704 Grand Marais, MI 49839
705 Phone: 906-494-2434

706 Email: bluroofmusic@gmail.com

707 The following individuals also contributed to the development of this document:

708	Charles Baxter	Xerox
709	Ron Bergman	(original Author)
710	John Boyd	Toshiba
711	Lee Farrell	
712	Walt Filbrich	
713	Gail Giansiracusa	Kyocera Mita
714	Smith Kennedy	HP Inc
715	Sheng Lee	Toshiba
716	Harry Lewis	
717	Christopher Rizzo	Xerox
718	Stuart Rowley	InfoPrint Solutions
719	Michael Sweet	Apple
720	Ole Skov	MPI Tech
721	Thomas Silver	Xerox
722	Jerry Thrasher	
723	Paul Tykodi	Tykodi Consulting Services
724	Bill Wagner	TIC
725	Craig Whittle	
726	Rick Yardumian	Canon
727	Peter Zehler	Xerox

728 12. Change History

729 **12.1 16 February 2019**

730 - Stable draft revision (Ira McDonald) – changes per PWG F2F review (February 2019).

731 - Changed status from “Prototype” to “Stable” per IPP WG consensus.

732 - Revised section 7.1 IPP Internationalization Considerations to delete [UNICODEXML].

733 - Revised section 10.2 Informative References to delete [UNICODEXML].

734 ~~12.1~~**12.2 13 February 2019**

735 - Prototype draft revision (Ira McDonald) – changes per IPP WG review (January 2019).

736 - Global – Revised all tables to make first row (header) repeat on every page.

737 - Verified section 2.3 Protocol Role Terminology normative references to [RFC7230] – no
738 change.

739 - Deleted section 3.2.3 MFDs with Web-based Fleet Management use case – out-of-
740 scope.

741 - Revised section 3.3 Exceptions to say there are no significant exceptions and deleted
742 corresponding Comment IM1.

743 - Revised section 4 SNMP Printer Model Extensions to delete Comment IM2 about
744 exposing further Printer MIB subunits in IPP since we already decided not to do so.

745 - Revised section 6.3 IPP Printer Conformance Requirements and section 6.4 IPP Client
746 Conformance Requirements to delete item (3) about implementing prtAlertTable since it's
747 out-of-scope.

748 - Revised section 7.1 IPP Internationalization Considerations to add bullets to all lists and
749 change [UTR20] (withdrawn technical report) to [UNICODEXML] (UTR20 transitioned to
750 W3C).

751 - Revised section 8.1 IPP Security Considerations to add bullets to all lists and correct an
752 indentation issue in one paragraph.

753 - Global – Revised section 10 References to change “http://www.ietf.org/rfc” to
754 “https://tools.ietf.org/html” and remove “.txt” suffix in order to get HTML RFC versions w/
755 errata references.

- 756 - Global – Revised section 10 References to append trailing “/” to all Unicode references,
757 update dated versions of all Unicode references, delete [UTR20] (withdrawn technical
758 report) and add [UNICODEXML] (UTR20 transitioned to W3C).
- 759 - Revised section 10.1 Normative References to delete [RFC2616] but keep [RFC7230].
- 760 - Revised section 10.2 Informative References to delete DMTF [WS-MGMT] and OASIS
761 [WSDM] web services management unused references – out-of-scope.
- 762 **12.212.3 28 December 2018**
- 763 - Interim draft revision (Ira McDonald) – changes per PWG F2F review (November 2018).
- 764 - **TODO – Update section 10 References.**
- 765 - Global – Replaced “[RFC8010]” and “[RFC8011]” with “[STD92]” and fixed References.
- 766 - Global – Replace “RFC2119]” with “[BCP14]” and fixed References.
- 767 - Global – Changed SNMP and IPP protocol roles for clarity per section 2.3 (see below).
- 768 - Revised document title and URI from “pmp” to “pwg” scope and v1.0 to v1.1.
- 769 - Revised copyright in headers and page 2 to show span “2012-2018”.
- 770 - Revised Abstract to simplify.
- 771 - Revised section 2.3 Protocol Role Terminology to change “Client” to “IPP Client”, change
772 “Printer” to “IPP Printer”, change “Printer MIB Agent” to “SNMP Printer”, and change “Printer
773 MIB Client” to “SNMP Client”.
- 774 - Revised title of section 3.1 Rationale for Printer MIB and IPP MFD Alerts to “Rationale”
775 and add numbering for clarity.
- 776 - Revised section 3.3 Exceptions to add Comment to define some (they’re missing).
- 777 - Revised section 3.4 Out of Scope to align text with current Document Object draft and
778 add numbering.
- 779 - Revised section 3.5 Design Requirements to align text with current Document Object
780 draft and add numbering.
- 781 - Revised title of section 4 Printer Model Extensions to “SNMP Printer Model Extensions”
782 for clarity (i.e., these are extensions are to the Printer MIB v2 model).
- 783 - Revised title of section 5 MFD and Printer Extension Alerts to “MFD Alerts” for clarity.
- 784 - Revised title of section 5.1 MFD Alert Groups to “MFD Subunit Alert Groups” for clarity.

- 785 - Revised title of section 5.2 MFD and Printer Extension Subunit Alerts to “MFD Subunit
786 Alerts” for clarity.
- 787 - Revised title of Table 2 MFD and Printer Subunit Alerts to “MFD Subunit Alerts” for clarity
788 and added note about “Error” ending only when MFD/Printer is stopped.
- 789 - Revised title of Table 3 IPP printer-state-reasons to “IPP MFD printer-state-reasons” for
790 clarity and added notes about “error” ending only when MFD/Printer is stopped and non-
791 mapping of transient FaxModem alerts to IPP.
- 792 - Revised Table 3 IPP MFD printer-state-reasons to add missing hyphen to “scan-media-
793 path-input-feed-error” to correct a typo.
- 794 - Revised title of section 7.1 IPP Standard Internationalization Considerations to “IPP
795 Internationalization Considerations” for clarity and removed numbering in first list.
- 796 - Revised title of section 7.2 MFD Alerts Internationalization Considerations to “SNMP
797 Internationalization Considerations” for clarity.
- 798 - Revised title of section 8.1 Standard IPP Security Considerations to “IPP Security
799 Considerations” for clarity.
- 800 - Revised title of section 8.2 MFD Alerts Security Considerations to “SNMP Security
801 Considerations” for clarity.
- 802 - Revised section 9.2 Alert Codes to suffix “—DEPRECATED” to all of the FaxModem
803 transient alerts (NOT mapped to IPP).
- 804 - Revised title of section 9.3 IPP Attribute and Keyword Value Registrations to “IPP
805 Attribute Value Registrations” for consistency and concatenated with former section 9.5
- 806 - Deleted original section 9.4 through section 9.8 (all redundant).
- 807 - Revised section 11 Author’s Address to move Ron Bergman down to Contributors (as
808 original Author), remove Lexmark from Jerry Thrasher, and add Rick Yardumian and
809 Christopher Rizzo.
- 810 **~~12.3~~12.4 13 August 2018**
- 811 - Interim draft revision (Ira McDonald).
- 812 - Revised section 5.2 Table 2 MFD and Printer Subunit Alerts, to add 15 new Marker
813 Supplies alerts, per Lee Hills (Xerox) and Mike Sweet (Apple).
- 814 - Revised section 5.3 Table 3 IPP printer-state-reasons, to correct numeric values for
815 several Scanner alerts (per Table 2) and add “scannerSensorMissing(5114)”, per Rick
816 Yardumian (Canon).

- 817 - Revised section 5.3 Table 3 IPP printer-state-reasons, to add 15 new Marker Supplies
818 alerts, per Lee Hills (Xerox) and Mike Sweet (Apple).
- 819 - Revised section 9.2 Alert Codes, to add new Marker Supplies and Scanner alerts (per
820 Table 2), per Lee Hills (Xerox), Rick Yardumian (Canon), and Mike Sweet (Apple).
- 821 - Revised section 9.3 IPP Attribute and Keyword Value Registrations, to add new Marker
822 Supplies and Scanner alerts (per Table 3), per Lee Hills (Xerox), Rick Yardumian (Canon),
823 and Mike Sweet (Apple).
- 824 - Revised sections 9.x to correct registration procedure references in RFC 8011.
- 825 - Deleted section 9.9 Semantic Model Registrations (no longer relevant).
- 826 - Revised section 10.1 Normative References, to add “STD92” for RFC 8010/8011 and
827 delete PWG 5108.07 (no longer relevant).
- 828 ~~12.4~~**12.5 9 February 2018**
- 829 - Initial draft revision (Smith Kennedy).
- 830 - Converted original version to current PWG document template.