



The Printer Working Group

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Working Draft

Printer MIB and IPP MFD Alerts (MFD Alerts)

Status: ~~Initial~~Interim

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" [RFC 8011] and IPP "printer-alert" [PWG5100.9]. An MFD is typically based on a printer with added scan- and fax-specific components in order to support print, copy, scan, and facsimile (fax) services. This document defines an update to the IANA-PRINTER-MIB to provide support for new MFD components and component-specific alerts and analogous Printer extension alerts for the existing Input, Output, and MediaPath components.

This document is a PWG Working Draft. For a definition of a "PWG Working Draft", see:

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

This document is available electronically at:

<http://ftp.pwg.org/pub/pwg/ipp/wd/wd-pmpmfdalerts10-201802090813.docx>

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48 system providers, network connectivity vendors, and print management application
49 developers. The group is chartered to make printers and the applications and operating
50 systems supporting them work together better. All references to the PWG in this
51 document implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.” In
52 order to meet this objective, the PWG will document the results of their work as open
53 standards that define print related protocols, interfaces, procedures and conventions.
54 Printer manufacturers and vendors of printer related software will benefit from the
55 interoperability provided by voluntary conformance to these standards.

56 In general, a PWG standard is a specification that is stable, well understood, and is
57 technically competent, has multiple, independent and interoperable implementations with
58 substantial operational experience, and enjoys significant public support.

59 For additional information regarding the Printer Working Group visit:

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67

68 About the Internet Printing Protocol Workgroup

69 The Internet Printing Protocol (IPP) workgroup has developed a modern, full-featured
70 network printing protocol, which is now the industry standard. IPP allows a print client to
71 query a printer for its supported capabilities, features, and parameters to allow the
72 selection of an appropriate printer for each print job. IPP also provides job information prior
73 to, during, and at the end of job processing.

74 For additional information regarding IPP visit:

75 <http://www.pwg.org/ipp/>

76 Implementers of this specification are encouraged to join the IPP Workgroup mailing list in
77 order to participate in any discussions of the specification. Suggested additions, changes,
78 or clarification to this specification, should be sent to the IPP Workgroup mailing list for
79 consideration.

80

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146 1. Introduction

147 This document defines simple extensions to the originally printer-specific IETF Printer MIB
148 v2 [RFC3805] (new enumeration values in prtAlertCode) and IETF IPP/1.1 [RFC29448011]
149 (new keyword values in “printer-state-reasons”) to add support for alert information for
150 multifunction devices (MFDs), which are now very popular alternatives to using separate
151 printer, copier, and facsimile equipment. Prior to the introduction of MFDs, printer vendors
152 and application developers had already created tools, management systems, and device
153 drivers based upon the Printer MIB v2 [RFC3805] and the prtAlertTable. MFDs are
154 typically less expensive than the equivalent set of individual devices, and have the
155 additional advantage of occupying much less office space.

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

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

163 2. Terminology

164 2.1 Conformance Terminology

165 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,
166 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as
167 defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119]. The
168 term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement
169 that applies when a specified condition is true.

170 2.2 Printing Terminology

171 Normative definitions and semantics of printing terms are imported from IETF Printer MIB
172 v2 [RFC3805], IETF Finisher MIB [RFC3806], and IETF Internet Printing Protocol/1.1:
173 Model and Semantics [RFC29448011].

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

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

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

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

183 *Physical Device*: a hardware implementation of an endpoint device, e.g., a marking engine,
184 a fax modem, etc.

185 **2.3 Protocol Role Terminology**

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

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

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

193 *Printer MIB Agent*: Listener for incoming SNMP Get and Set management requests and
194 sender of optional outgoing SNMP notifications for a Printer or MFD (i.e., an SNMP Agent).

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

198 **2.4 Other Terminology**

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

200 **2.5 Acronyms and Organizations**

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

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

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

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

205 **3. Requirements**

206 **3.1 Rationale for Printer MIB and IPP MFD Alerts**

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

208 An abstract model of a PrintDevice in section 2.2 of the IETF Printer MIB v2 [RFC3805].

209 An SNMP Alert table for a PrintDevice to support the service and maintenance functions in
210 section 2.2.13 of the IETF Printer MIB v2 [RFC3805].

211 A set of design goals for status monitoring in a printing protocol in section 3.1.3 “Viewing
212 the status and capabilities of a printer” (for End User), section 3.2.1 “Alerting” (for
213 Operator), and section 3.3 “Administrator” (the bullet requirement to “administrate billing or
214 other charge-back mechanisms”) of the IETF IPP Design Goals [RFC2567].

215 A set of MFD service types for Imaging Systems in the JmJobServiceTypesTC textual
216 convention in section 4 of the IETF Job Monitoring MIB [RFC2707].

217 An abstract model of an MFD job in section 2 of the IETF Job Monitoring MIB [RFC2707].

218 An abstract model of an MFD in the PWG MFD Model and Common Semantics
219 [PWG5108.1].

220 In the years since the Printer MIB v2 [RFC3805] was published printers have evolved into
221 MFDs. Prior to the introduction of MFDs, printer vendors and application developers had
222 already created tools, management systems, and device drivers based upon the Printer
223 MIB v2 [RFC3805] and the prtAlertTable. Now that these same vendors are building
224 MFDs, there is an urgent need to leverage these existing tools and management
225 applications.

226 This document defines a new set of MFD alert groups and MFD component alerts that will
227 allow the applications currently using the prtAlertTable to support MFDs.

228 **3.2 Use Cases**

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

230 **3.2.1 MFDs with OEM Components**

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

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

240 3.2.2 MFDs with Alert Messages

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

251 3.2.3 MFDs with Web-based Fleet Management

252 Company C provides a fleet management system based upon DMTF WS-Management
253 [WS-MGMT], OASIS WSDM [WSDM], or any other web-based protocol that is appropriate
254 for fleet management. The communication between the local fleet management server and
255 the local printers is accomplished via SNMP and the information available in the
256 prtAlertTable is queried to maintain the logs in the remote fleet management server. When
257 MFDs are added to the local network, the fleet management system can monitor all the
258 MFD functions with only minor modifications to support the MFD Alerts.

259 3.3 Exceptions

260 Provide exceptions for the use cases using the casual use case format.

261 None in original MFD Alerts...

262 3.4 Out of Scope

263 This MFD Alerts specification should not:

- 264 1. Define any components that are not already defined in the PWG MFD Model
265 and Common Semantics [PWG5108.1].
- 266 2. Define any semantics for workflow applications.
- 267 3. Define any semantics for document repositories.
- 268 4. Define any application-specific semantics for MFD monitoring using MFD Alerts.

269 3.5 Design Requirements

270 This MFD Alerts specification should satisfy the following design requirements:

271 Define a set of alert groups to provide alert capability for MFDs equivalent to the capability
272 currently provided for printers for registration in the PrtAlertGroupTC in the IANA Printer
273 MIB [IANAPRT].

274 Define new alert groups for MFD components only where functionally equivalent groups do
275 not already exist for the PrintDevice. For example, a ScanMediaPath is inherently entirely
276 separate from any print MediaPath.

277 Do not define new alert groups for MFD components where functionally equivalent groups
278 already exist for the PrintDevice. For example, ScanDevice covers should be modeled
279 using the existing Cover group.

280 Define a set of component-specific alerts for new ScanDevice and FaxDevice components
281 for registration in the PrtAlertCodeTC in the IANA Printer MIB [IANAPRT].

282 Define a set of component-specific extension alerts for existing Input, Output, and
283 MediaPath alert groups that correspond to extensions for the ScanMediaPath alert group.

284 4. Printer Model Extensions

285 This section briefly summarizes extensions to the abstract Printer Model, originally defined
286 in section 2 of IETF Printer MIB v2 [RFC3805], based on the PWG MFD Model and
287 Common Semantics [PWG5108.1], to include the ScanDevice and FaxDevice, their
288 additional subunits, and the new OutputChannel subunit. The following two figures are
289 taken directly from [PWG5108.1].
290

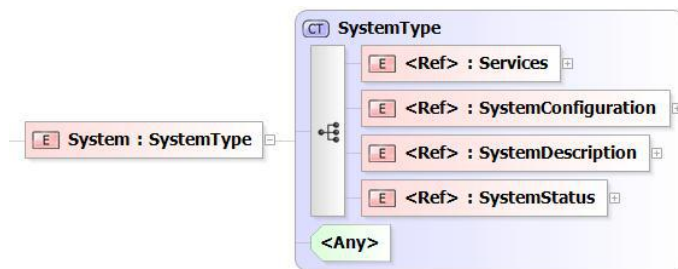
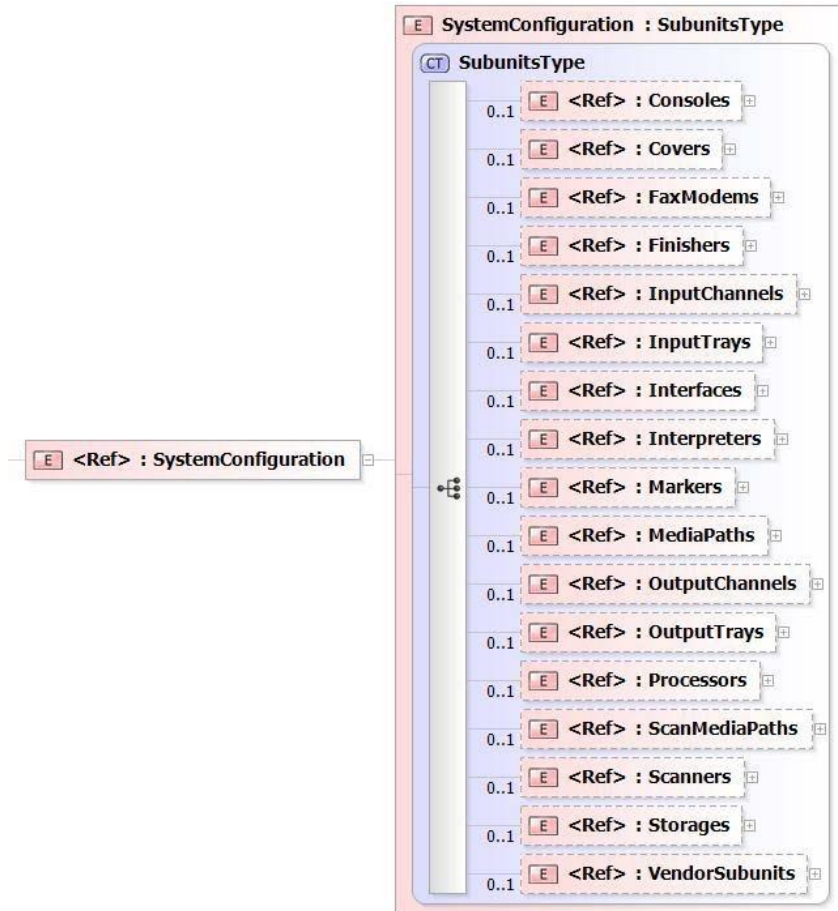


Figure 1: System Object in MFD Model



291

292

Figure 2: SystemConfiguration Element in MFD Model

293 4.1 ScanDevice

294 The ScanDevice uses the following subunits: Console, Cover, Interface, Interpreter,
295 OutputChannel, Processor, ScanMediaPath, Scanner, Storage, and optionally the
296 VendorSubunit.

297 4.2 FaxDevice

298 The FaxDevice uses the following subunits: Console, Cover, FaxModem, Finisher,
299 InputChannel, InputTray, Interface, Interpreter, Marker, MediaPath, OutputChannel,

300 OutputTray, Processor, ScanMediaPath, Scanner, Storage, and optionally the
301 VendorSubunit.

302 4.3 OutputChannel

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

305 5. MFD and Printer Extension Alerts

306 5.1 MFD Alert Groups

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

309 **Table 1: MFD Alert Groups**

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

310 5.2 MFD and Printer Extension Subunit Alerts

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

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

318 **Table 2: MFD and Printer Subunit Alerts**

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
<u>-- Marker Supplies Group</u>	
<u>markerCleanerMissing</u>	<u>1116</u>
<u>markerDeveloperMissing</u>	<u>1117</u>
<u>markerFuserMissing</u>	<u>1118</u>
<u>markerInkMissing</u>	<u>1119</u>
<u>markerOpcMissing</u>	<u>1120</u>
<u>markerPrintRibbonMissing</u>	<u>1121</u>
<u>markerSupplyAlmostEmpty</u>	<u>1122</u>
<u>markerSupplyEmpty</u>	<u>1123</u>
<u>markerSupplyMissing</u>	<u>1124</u>
<u>markerWasteAlmostFull</u>	<u>1125</u>
<u>markerWasteFull</u>	<u>1126</u>
<u>markerWasteMissing</u>	<u>1127</u>
<u>markerWasteInkReceptacleMissing</u>	<u>1128</u>
<u>markerWasteTonerReceptacleMissing</u>	<u>1129</u>
<u>markerTonerMissing</u>	<u>1130</u>
-- 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
faxModemProtocolError	6111
faxModemEquipmentFailure	6112
faxModemNoDialTone	6113
faxModemLineBusy	6114
faxModemNoAnswer	6115
faxModemVoiceDetected	6116
faxModemCarrierLost	6117
faxModemTrainingFailure	6118

319 5.3 IPP printer-state-reasons (1setOf type2 keyword)

320 | The new MFD alert values of "printer-state-reasons" [RFC29448011] are defined in this
 321 | section for registration in IANA IPP Registry [IANAPRT]. The table below defines new
 322 | MFD alert values of "printer-state-reasons" [RFC29448011] and their mapping to/from new
 323 | MFD alert values of 'PrtAlertCodeTC' [IANAPRT] defined above in sections 5.2 and 5.3.

324

Table 3: IPP printer-state-reasons

PrtAlertCodeTC	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	
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(510411)	scanner-sensor-life-almost-over
scannerSensorLifeOver(510512)	scanner-sensor-life-over
scannerSensorFailure(510613)	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)	fax-modem-inactivity-timeout
faxModemProtocolError(6111)	fax-modem-protocol-error
faxModemEquipmentFailure(6112)	fax-modem-equipment-failure
faxModemNoDialTone(6113)	fax-modem-no-dial-tone
faxModemLineBusy(6114)	fax-modem-line-busy
faxModemNoAnswer(6115)	fax-modem-no-answer
faxModemVoiceDetected(6116)	fax-modem-voice-detected
faxModemCarrierLost(6117)	fax-modem-carrier-lost
faxModemTrainingFailure(6118)	fax-modem-training-failure

325

326 6. Conformance Requirements

327 6.1 Printer MIB Agent Conformance Requirements

328 To claim conformance to this specification, a Printer MIB Agent implementation for a
329 Multifunction Device:

330

- 331 (a) MUST implement the prtAlertTable defined in IETF Printer MIB v2;
- 332 (b) SHOULD implement the prtAlertTable defined in IETF Printer MIB v2 [RFC3805] as
333 persistent across power cycles and hardware reconfigurations, for reliable fleet
334 management.
- 335 (c) MUST support the MFD alert groups defined in section 5.1 of this specification
336 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the
337 corresponding functionality (e.g., scan) is supported on the MFD;
- 338 (d) MUST support the MFD and Printer alert codes defined in section 5.2 of this
339 specification which are registered in PrtAlertCodeTC in IANA Printer MIB
340 [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the MFD;
- 341 (e) MUST encode and interpret values of the prtAlertGroup and prtAlertCode objects
342 defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer
343 MIB [IANAPRT].

344 6.2 Printer MIB Client Conformance Requirements

345 To claim conformance to this specification, a Printer MIB Client implementation that
346 supports Multifunction Devices:

347

- 348 (a) MUST support the prtAlertTable defined in IETF Printer MIB v2;
349 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
350 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the
351 corresponding functionality (e.g., scan) is supported on the Printer MIB Client;
352 (c) MUST support the MFD and Printer alert codes defined in section 5.2 of this
353 specification which are registered in PrtAlertCodeTC in IANA Printer MIB
354 [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the Printer
355 MIB Client;
356 (d) MUST decode and interpret values of the prtAlertGroup and prtAlertCode objects
357 defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer
358 MIB [IANAPRT].

359 6.3 IPP Printer Conformance Requirements

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

- 362
363 (a) MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes
364 defined in PWG IPP Printer State Extensions [PWG5100.9];
365 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
366 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for
367 keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is
368 supported on the MFD;
369 (c) MUST support the MFD and Printer alert codes defined in section 5.2 of this
370 specification which are registered in PrtAlertCodeTC in IANA Printer MIB
371 [IANAPRT] and IANA IPP Registry [IANAIPP] for keyword values in “printer-alert”
372 and “printer-state-reasons”, if the corresponding functionality (e.g., scan) is
373 supported on the MFD;
374 (d) MUST encode and interpret values of “printer-alert” and “printer-state-reasons”
375 according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP];
376 (e) MUST implement the prtAlertTable defined in IETF Printer MIB v2, if a Printer MIB
377 Agent is implemented.

378 6.4 IPP Client Conformance Requirements

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

- 381
382 (a) MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes
383 defined in PWG IPP Printer State Extensions [PWG5100.9];
384 (b) MUST support the MFD alert groups defined in section 5.1 of this specification
385 which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for
386 keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is
387 supported on the IPP Client;

- 388 (c) MUST support the MFD and Printer alert codes defined in section 5.2 of this
389 specification which are registered in PrtAlertCodeTC in IANA Printer MIB
390 [IANAPRT] and IANA IPP Registry [IANAIPP] for keyword values in “printer-alert”
391 and “printer-state-reasons”, if the corresponding functionality (e.g., scan) is
392 supported on the IPP Client;
- 393 (d) MUST decode and interpret values of “printer-alert” and “printer-state-reasons”
394 according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP];
- 395 (e) MUST support the prtAlertTable defined in IETF Printer MIB v2, if a Printer MIB
396 Client is implemented.
397

398 7. Internationalization Considerations

399 7.1 IPP Standard Internationalization Considerations

400 For interoperability and basic support for multiple languages, conforming implementations
401 MUST support:

- 402 1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
403 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
- 404 1. The Unicode Format for Network Interchange [RFC5198] which requires
405 transmission of well-formed UTF-8 strings and recommends transmission of
406 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

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

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

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

- 416 Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- 417 Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 418 Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 419 Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 420 Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 421 Unicode Collation Algorithm [UTS10] – sorting
- 422 Unicode Locale Data Markup Language [UTS35] – locale databases

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

- 425 Unicode Character Encoding Model [UTR17] – multi-layer character model
- 426 Unicode in XML and other Markup Languages [UTR20] – XML usage
- 427 Unicode Character Property Model [UTR23] – character properties

428 Unicode Conformance Model [UTR33] – Unicode conformance basis

429 7.2 MFD Alerts Internationalization Considerations

430 The MFD alert groups and alert codes defined in this document do not add any
431 internationalization considerations beyond those covered in section 8 of the IETF Printer
432 MIB v2 [RFC3805]. The MFD extensions to the IPP Printer "printer-alert" and "printer-
433 state-reasons" attributes defined in this document do not add any internationalization
434 considerations beyond covered in section 7 of IPP/1.1 Model and Semantics
435 | [RFC~~2944~~8011].

436 8. Security Considerations

437 8.1 Standard IPP Security Considerations

438 The IPP extensions defined in this document require the same security considerations as
439 | defined in the IPP/1.1: Model and Semantics [RFC~~2944~~8011].

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

442 Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks

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

445 Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

446 8.2 MFD Alerts Security Considerations

447 The MFD alert groups and alert codes defined in this document do not add any security
448 considerations beyond those covered in section 9 of the IETF Printer MIB v2 [RFC3805].
449 The MFD extensions to the IPP Printer "printer-alert" and "printer-state-reasons" attributes
450 defined in this document do not add any security considerations beyond covered in section
451 | 8 of IPP/1.1 Model and Semantics [RFC~~2944~~8011].

452 9. IANA and PWG Considerations

453 9.1 Alert Groups

454 This section contains the exact registration information for IANA to update the IANA-
455 PRINTER-MIB PrtAlertGroupTC Registry [IANAPRT], according to the procedures defined
456 in the IETF Printer MIB v2 [RFC3805] section 5, to cover the new alert groups defined in
457 section 5.1 of this document. Add to PrtAlertGroupTC the following:

```

458         -- Values for the ScanDevice
459         scanDevice(50),          -- MFD Extension
460         scanner(51),            -- MFD Extension
461         scanMediaPath(52),      -- MFD Extension
462         -- Values (50) to (59) reserved for the ScanDevice
463         -- Values for the FaxDevice
464         faxDevice(60),          -- MFD Extension
465         faxModem(61),          -- MFD Extension
466         -- Values (60) to (69) reserved for the FaxDevice
467         -- Values for other common subunits
468         outputChannel(70),      -- MFD Extension
469         -- Values (70) to (79) reserved for common subunits

```

470 9.2 Alert Codes

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

```

475         -- Input Group
476         inputMediaTrayFeedError(814),
477         inputMediaTrayJam(815),
478         inputMediaTrayFailure(816),
479         inputMediaTrayPickRollerLifeWarn(817),
480         inputMediaTrayPickRollerLifeOver(818),
481         inputMediaTrayPickRollerFailure(819),
482         inputMediaTrayPickRollerMissing(820),
483
484         -- Output Group
485         outputMediaTrayFeedError(905),
486         outputMediaTrayJam(906),
487         outputMediaTrayFailure(907),
488
489         -- Marker Supplies Group
490         markerCleanerMissing(1116),
491         markerDeveloperMissing(1117),
492         markerFuserMissing(1118),
493         markerInkMissing(1119),
494         markerOpcMissing(1120),
495         markerPrintRibbonMissing(1121),
496         markerSupplyAlmostEmpty(1122),
497         markerSupplyEmpty(1123),
498         markerSupplyMissing(1124),
499         markerWasteAlmostFull(1125),
500         markerWasteFull(1126),
501         markerWasteMissing(1127),
502         markerWasteInkReceptacleMissing(1128),
503         markerWasteTonerReceptacleMissing(1129),
504         markerTonerMissing(1130).
505
506         -- Media Path Group
507         mediaPathFailure(1305),
508         mediaPathJam(1306),
509         mediaPathInputRequest(1310),

```

```
510         mediaPathInputFeedError(1311),
511         mediaPathInputJam(1312),
512         mediaPathOutputFeedError(1321),
513         mediaPathOutputJam(1322),
514         mediaPathOutputFull(1323),
515         mediaPathPickRollerLifeWarn(1331),
516         mediaPathPickRollerLifeOver(1332),
517         mediaPathPickRollerFailure(1333),
518         mediaPathPickRollerMissing(1334),
519
520     -- Scanner Group
521     scannerLightLifeAlmostOver(5101),
522     scannerLightLifeOver(5102),
523     scannerLightFailure(5103),
524     scannerLightMissing(5104),
525     scannerSensorLifeAlmostOver(5111),
526     scannerSensorLifeOver(5112),
527     scannerSensorFailure(5113),
528     scannerSensorMissing(5114),
529
530     -- Scan Media Path Group
531     scanMediaPathTrayMissing(5201),
532     scanMediaPathTrayAlmostFull(5202),
533     scanMediaPathTrayFull(5203),
534     scanMediaPathFailure(5205),
535     scanMediaPathJam(5206),
536     scanMediaPathInputRequest(5210),
537     scanMediaPathInputFeedError(5211),
538     scanMediaPathInputJam(5212),
539     scanMediaPathOutputFeedError(5221),
540     scanMediaPathOutputJam(5222),
541     scanMediaPathOutputFull(5223),
542     scanMediaPathPickRollerLifeWarn(5231),
543     scanMediaPathPickRollerLifeOver(5232),
544     scanMediaPathPickRollerFailure(5233),
545     scanMediaPathPickRollerMissing(5234),
546
547     -- Fax Modem Group
548     faxModemMissing(6101),
549     faxModemLifeAlmostOver(6102),
550     faxModemLifeOver(6103),
551     faxModemTurnedOn(6104),
552     faxModemTurnedOff(6105),
553     faxModemInactivityTimeout(6110),
554     faxModemProtocolError(6111),
555     faxModemEquipmentFailure(6112),
556     faxModemNoDialTone(6113),
557     faxModemLineBusy(6114),
558     faxModemNoAnswer(6115),
559     faxModemVoiceDetected(6116),
560     faxModemCarrierLost(6117),
561     faxModemTrainingFailure(6118),
```

562 **9.3 IPP Attribute and Keyword Value Registrations**

563 This section contains the exact registration information for IANA to update according to the
 564 procedures defined in [RFC29148011].

565 The registry entry will contain the following information:

```

566     Section 9 (References)
567
568     [PWG5107.3] PWG Multifunction Device Alerts, PWG 5107.3, June 2012TBD.
569                   ftp://ftp.pwg.org/pub/pwg/candidates/ipp/wd
570                   es-pmpmfdalerts10-20120629-5107.3.pdf
571                   wd-pmpmfdalerts10-20180813.docx
572
573     Section 2 (Keyword Attribute Values)
574     Attribute Name (attribute syntax)           Reference
575     -----
576     printer-state-reasons (1setOf type2 keyword) [RFC29148011]
577     input-media-tray-feed-error                 [PWG5107.3]
578     input-media-tray-jam                       [PWG5107.3]
579     input-media-tray-failure                   [PWG5107.3]
580     input-pick-roller-life-warn                [PWG5107.3]
581     input-pick-roller-life-over                [PWG5107.3]
582     input-pick-roller-failure                 [PWG5107.3]
583     input-pick-roller-missing                  [PWG5107.3]
584
585     output-media-tray-feed-error               [PWG5107.3]
586     output-media-tray-jam                     [PWG5107.3]
587     output-media-tray-failure                  [PWG5107.3]
588
589     marker-cleaner-missing                    [PWG5107.3]
590     marker-developer-missing                 [PWG5107.3]
591     marker-fuser-missing                     [PWG5107.3]
592     marker-ink-missing                       [PWG5107.3]
593     marker-opc-missing                       [PWG5107.3]
594     marker-print-ribbon-missing             [PWG5107.3]
595     marker-supply-almost-empty              [PWG5107.3]
596     marker-supply-empty                      [PWG5107.3]
597     marker-supply-missing                    [PWG5107.3]
598     marker-waste-almost-full                 [PWG5107.3]
599     marker-waste-full                       [PWG5107.3]
600     marker-waste-missing                    [PWG5107.3]
601     marker-waste-ink-receptacle-missing    [PWG5107.3]
602     marker-waste-toner-receptacle-missing  [PWG5107.3]
603     marker-toner-missing                    [PWG5107.3]
604
605     media-path-failure                         [PWG5107.3]
606     media-path-jam                             [PWG5107.3]
607     media-path-input-request                   [PWG5107.3]
608     media-path-input-feed-error                [PWG5107.3]
609     media-path-input-jam                       [PWG5107.3]
610     media-path-input-empty                     [PWG5107.3]
611     media-path-output-feed-error               [PWG5107.3]
612     media-path-output-jam                     [PWG5107.3]
613     media-path-output-full                     [PWG5107.3]
  
```


614	media-path-pick-roller-life-warn	[PWG5107.3]
615	media-path-pick-roller-life-over	[PWG5107.3]
616	media-path-pick-roller-failure	[PWG5107.3]
617	media-path-pick-roller-missing	[PWG5107.3]
618		
619	scanner-light-life-almost-over	[PWG5107.3]
620	scanner-light-life-over	[PWG5107.3]
621	scanner-light-failure	[PWG5107.3]
622	scanner-light-missing	[PWG5107.3]
623	scanner-sensor-life-almost-over	[PWG5107.3]
624	scanner-sensor-life-over	[PWG5107.3]
625	scanner-sensor-failure	[PWG5107.3]
626	scanner-sensor-missing	[PWG5107.3]
627		
628	scan-media-path-tray-missing	[PWG5107.3]
629	scan-media-path-tray-almost-full	[PWG5107.3]
630	scan-media-path-tray-full	[PWG5107.3]
631	scan-media-path-failure	[PWG5107.3]
632	scan-media-path-jam	[PWG5107.3]
633	scan-media-path-input-request	[PWG5107.3]
634	scan-media-path-input-feed-error	[PWG5107.3]
635	scan-media-path-input-jam	[PWG5107.3]
636	scan-media-path-output-feed-error	[PWG5107.3]
637	scan-media-path-output-jam	[PWG5107.3]
638	scan-media-path-output-full	[PWG5107.3]
639	scan-media-path-pick-roller-life-warn	[PWG5107.3]
640	scan-media-path-pick-roller-life-over	[PWG5107.3]
641	scan-media-path-pick-roller-failure	[PWG5107.3]
642	scan-media-path-pick-roller-missing	[PWG5107.3]
643		
644	fax-modem-missing	[PWG5107.3]
645	fax-modem-life-almost-over	[PWG5107.3]
646	fax-modem-life-over	[PWG5107.3]
647	fax-modem-turned-on	[PWG5107.3]
648	fax-modem-turned-off	[PWG5107.3]
649	fax-modem-inactivity-timeout	[PWG5107.3]
650	fax-modem-protocol-error	[PWG5107.3]
651	fax-modem-equipment-failure	[PWG5107.3]
652	fax-modem-no-dial-tone	[PWG5107.3]
653	fax-modem-line-busy	[PWG5107.3]
654	fax-modem-no-answer	[PWG5107.3]
655	fax-modem-voice-detected	[PWG5107.3]
656	fax-modem-carrier-lost	[PWG5107.3]
657	fax-modem-training-failure	[PWG5107.3]

658 9.4 Attribute Registrations

659 The attributes defined in this document will be published by IANA according to the
660 procedures in IPP/1.1 Model and Semantics [RFC29448011] section 6.27.2 in the
661 following file:

662 <http://www.iana.org/assignments/ipp-registrations>

663 The registry entries will contain the following information:

664	Document Description attributes:	Reference
665	-----	-----
666	name (type)	[REFERENCE]
667		
668	Document Status attributes:	Reference
669	-----	-----
670	name (type)	[REFERENCE]
671		
672	Document Template attributes:	Reference
673	-----	-----
674	name (type)	[REFERENCE]
675		
676	Job Description attributes:	Reference
677	-----	-----
678	name (type)	[REFERENCE]
679		
680	Job Status attributes:	Reference
681	-----	-----
682	name (type)	[REFERENCE]
683		
684	Job Template attributes:	Reference
685	-----	-----
686	name (type)	[REFERENCE]
687		
688	Operation attributes:	Reference
689	-----	-----
690	name (type)	[REFERENCE]
691		
692	Printer Description attributes:	Reference
693	-----	-----
694	name (type)	[REFERENCE]
695		
696	Printer Status attributes:	Reference
697	-----	-----
698	name (type)	[REFERENCE]
699		
700	Subscription Description attributes:	Reference
701	-----	-----
702	name (type)	[REFERENCE]
703		
704	Subscription Status attributes:	Reference
705	-----	-----
706	name (type)	[REFERENCE]
707		
708	Subscription Template attributes:	Reference
709	-----	-----
710	name (type)	[REFERENCE]
711		

712 9.5 Attribute Value Registrations

713 The attributes defined in this document will be published by IANA according to the
 714 | procedures in IPP/1.1 Model and Semantics [RFC29448011] section 6.47.3 in the
 715 following file:

716 <http://www.iana.org/assignments/ipp-registrations>

717 The registry entries will contain the following information:

718	Attributes (attribute syntax)		Reference
719	Keyword Attribute Value		
720	-----		-----
721	name (type2 keyword)		[REFERENCE]
722	value-1		[REFERENCE]
723	value-2		[REFERENCE]
724	name-supported (1setOf type2 keyword)		[REFERENCE]
725	< all name values >		[REFERENCE]

726 9.6 Type2 enum Registrations

727 The attributes defined in this document will be published by IANA according to the
 728 | procedures in IPP Model and Semantics [RFC29118011] section 6.47.4 in the following
 729 | file:

730 <http://www.iana.org/assignments/ipp-registrations>

731 The registry entries will contain the following information:

732	Attributes (attribute syntax)		Reference
733	Enum Value Enum Symbolic Name		
734	-----	-----	-----
735	name (type2 enum)		[REFERENCE]
736	3 value-3		[REFERENCE]
737	4 value-4		[REFERENCE]
738			
739	operations-supported (1setOf type2 enum)		[RFC29118011]
740	0xXXXX Operation-Name		[REFERENCE]

741 9.7 Operation Registrations

742 The attributes defined in this document will be published by IANA according to the
 743 | procedures in IPP/1.1 Model and Semantics [RFC29118011] section 6.47.8 in the
 744 | following file:

745 <http://www.iana.org/assignments/ipp-registrations>

746 The registry entries will contain the following information:

747	Operation Name	Reference
748	-----	-----
749	Operation-Name	[REFERENCE]
750	Existing-Operation-Name (Extension)	[REFERENCE]

751 **9.8 Status Code Registrations**

752 The attributes defined in this document will be published by IANA according to the
 753 procedures in IPP/1.1 Model and Semantics [RFC29148011] section 6.67.9 in the
 754 following file:

755 <http://www.iana.org/assignments/ipp-registrations>

756 The registry entries will contain the following information:

757	Value	Status Code Name	Reference
758	-----	-----	-----
759	0x0400:0x04FF	- Client Error:	
760	0x04XX	client-error-name	[REFERENCE]
761	0x0500:0x05FF	- Server Error:	
762	0x05XX	server-error-name	[REFERENCE]

763 **9.9 Semantic Model Registrations**

764 ~~The extensions defined in this specification and provided in the following file:~~

765 ~~<http://ftp.pwg.org/pub/pwg/NAME/wd/wd-docname-YYYYMMDD.zip>~~

766 ~~will be added to the PWG Semantic Model XML schema.~~

767 **OR**

768 ~~Except as noted below, the IPP attributes, values, and operations defined in this~~
 769 ~~specification and listed in the preceding sections will be added to the PWG Semantic~~
 770 ~~Model XML schema using the method defined in section 21 of [PWG5108.07].~~

771 ~~Table 2 lists the attributes that are mapped to alternate element names.~~

772 **Table 4 – New Semantic Model Element Names**

Attribute Name	Element Name
name	AlternateName
name-supported	Capabilities/AlternateName

773 ~~Table 3 lists the values that are mapped to alternate Well-Known Values.~~

774 **Table 5 – New Semantic Model Well-Known Values**

Attribute Name	Value	Well-Known Value
name	value-1	AlternateValue1
name	value-2	AlternateValue2

775 ~~Table 4 lists the operations that are mapped to alternate operation names.~~

776 **Table 6 – New Semantic Model Operations**

777

IPP Operation Name	Semantic Model Operation Name
Operation-Get-Name	AlternateGetName
Operation-Set-Name	AlternateSetName

778 **10. References**779 **10.1 Normative References**

- 780 [IANAIPP] "IANA IPP Registry", IANA Registry,
781 <http://www.iana.org/assignments/ipp-registrations>
- 782 [IANAPRT] "IANA Printer MIB", IANA Registry,
783 <http://www.iana.org/assignments/ianaprinter-mib>
- 784 [ISO10646] "Information technology -- Universal Coded Character Set (UCS)",
785 ISO/IEC 10646:2011
- 786 ~~[PWG5108.07] — P. Zehler, "PWG Print Job Ticket and Associated Capabilities Version~~
787 ~~4.0", PWG 5108.07-2012, August 2012,~~
788 ~~[http://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-](http://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-5108.07.pdf)~~
789 ~~[5108.07.pdf](http://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-5108.07.pdf)~~
- 790 [RFC2119] S. Bradner, "Key words for use in RFCs to Indicate Requirement
791 Levels", RFC 2119/BCP 14, March 1997,
792 <http://tools.ietf.org/html/rfc2119>
- 793 [RFC2616] R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T.
794 Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616,
795 <http://www.ietf.org/rfc/rfc2616.txt>
- 796 [RFC3805] R. Bergman, H. Lewis, I. McDonald, "IETF Printer MIB v2", RFC 3805,
797 June 2004, <http://www.ietf.org/rfc/rfc3805.txt>
- 798 [RFC3806] R. Bergman, H. Lewis, I. McDonald, "Printer Finishing MIB", RFC
799 3806, June 2004, <http://www.ietf.org/rfc/rfc3806.txt>
- 800 [RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange",
801 RFC 5198, March 2008, <http://tools.ietf.org/html/rfc5198>
- 802 [RFC7230] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1):
803 Message Syntax and Routing", RFC 7230, June 2014,
804 <https://tools.ietf.org/html/rfc7230>
- 805 [RFC8010] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1: Encoding and
806 Transport", RFC 8010/~~STD 92~~, January 2017,
807 <https://tools.ietf.org/html/rfc8010>

808	[RFC8011]	M. Sweet, I. McDonald, "Internet Printing Protocol/1.1: Model and
809		Semantics", RFC 8011/ STD 92 , January 2017,
810		https://tools.ietf.org/html/rfc8011
811	[STD63]	F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC
812		3629/STD 63, November 2003, http://tools.ietf.org/html/rfc3629
813	[STD66]	T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifier
814		(URI): Generic Syntax", RFC 3986/STD 66, January 2005,
815		http://tools.ietf.org/html/rfc3986
816	[UAX9]	Unicode Consortium, "Unicode Bidirectional Algorithm", UAX#9, June
817		2014 May 2016,
818		http://www.unicode.org/reports/tr9/tr9-31.html
		Field Code Changed
819	[UAX14]	Unicode Consortium, "Unicode Line Breaking Algorithm", UAX#14,
820		June 2014 June 2016,
821		http://www.unicode.org/reports/tr14/tr14-33.html
		Field Code Changed
822	[UAX15]	Unicode Consortium, "Normalization Forms", UAX#15, June
823		2014 February 2016,
824		http://www.unicode.org/reports/tr15/tr15-41.html
		Field Code Changed
825	[UAX29]	Unicode Consortium, "Unicode Text Segmentation", UAX#29, June
826		2014 June 2016,
827		http://www.unicode.org/reports/tr29/tr29-25.html
		Field Code Changed
828	[UAX31]	Unicode Consortium, "Unicode Identifier and Pattern Syntax",
829		UAX#31, June 2014 May 2016,
830		http://www.unicode.org/reports/tr31/tr31-21.html
		Field Code Changed
831	[UNICODE]	Unicode Consortium, "Unicode Standard", Version 810 .0.0, June
832		2015 June 2017,
833		http://www.unicode.org/versions/Unicode810.0.0/
		Field Code Changed
834	[UTS10]	Unicode Consortium, "Unicode Collation Algorithm", UTS#10, June
835		2014 May 2016,
836		http://www.unicode.org/reports/tr10/tr10-30.html
		Field Code Changed
837	[UTS35]	Unicode Consortium, "Unicode Locale Data Markup Language",
838		UTS#35, September 2014 October 2016,
839		http://www.unicode.org/reports/tr35/tr35-37/tr35.html
		Field Code Changed
840	[UTS39]	Unicode Consortium, "Unicode Security Mechanisms", UTS#39,
841		September 2014 June 2016,
842		http://www.unicode.org/reports/tr39/tr39-9.html
		Field Code Changed

843 **10.2 Informative References**

- 844 | ~~[REFERENCE]~~ — ~~F. Last author list or standards body, "Title of referenced document",~~
 845 | ~~Document Number, Month YYYY, URL (if any)~~
- 846 [RFC1759] R. Smith, F. Wright, T. Hastings, S. Zilles, J. Gyllenskog, "IETF Printer
 847 MIB", RFC 1759, March 1995, <http://www.ietf.org/rfc/rfc1759.txt>
- 848 [RFC2567] F.D. Wright, "IETF Design Goals for an Internet Printing Protocol",
 849 RFC 2567, April 1999, <http://www.ietf.org/rfc/rfc2567.txt>
- 850 [RFC2707] R. Bergman, T. Hastings, S. Isaacson, H. Lewis, "IETF Job Monitoring
 851 MIB - V1.0", RFC 2707, September 1999,
 852 <http://www.ietf.org/rfc/rfc2707.txt>
- 853 [UTR17] Unicode Consortium "Unicode Character Encoding Model", UTR#17,
 854 November 2008,
 855 | <http://www.unicode.org/reports/tr17/tr17-7.html>
- 856 [UTR20] Unicode Consortium "Unicode in XML and other Markup Languages",
 857 UTR#20, January 2013,
 858 | <http://www.unicode.org/reports/tr20/tr20-9.html>
- 859 [UTR23] Unicode Consortium "Unicode Character Property Model", UTR#23,
 860 | ~~November 2008~~ ~~May 2015~~,
 861 | <http://www.unicode.org/reports/tr23/tr23-9.html>
- 862 [UTR33] Unicode Consortium "Unicode Conformance Model", UTR#33,
 863 November 2008,
 864 | <http://www.unicode.org/reports/tr33/tr33-5.html>
- 865 [UNISECFAQ] Unicode Consortium "Unicode Security FAQ", ~~November 2013~~
 866 | ~~November 2016~~,
 867 | <http://www.unicode.org/faq/security.html>
- 868 [WS-MGMT] DMTF, "DMTF Web Services for Management (WS-Management)
 869 v1.0.0", DSP0226, February 2008,
 870 | http://dmtf.org/sites/default/files/standards/documents/DSP0226_1.0.0
 871 | [.pdf](#)
- 872 [WSDM] OASIS, "OASIS Web Services Distributed Management (WSDM)",
 873 composed of [WSDM-MOWS], [WSDM-MUWS1], [WSDM-MUWS2],
 874 August 2006, [http://www.oasis-](http://www.oasis-open.org/committees/download.php/20571/wsdm-1.1-os-01.zip)
 875 | [open.org/committees/download.php/20571/wsdm-1.1-os-01.zip](http://www.oasis-open.org/committees/download.php/20571/wsdm-1.1-os-01.zip)
- 876 [WSDM-MOWS] K. Wilson, I. Sadukin, "OASIS Web Services Distributed Management:
 877 Management of Web Services (WSDM-MOWS 1.1)", August 2006,

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

- 878 <http://www.oasis-open.org/committees/download.php/20576/wsdm->
 879 [muws1-1.1-spec-os-01.pdf](http://www.oasis-open.org/committees/download.php/20576/wsdm-)
- 880 [WSDM-MUWS1] V. Bullard, W. Vambenepe, "OASIS Web Services Distributed
 881 Management: Management Using Web Services (MUWS 1.1) Part 1",
 882 August 2006, <http://www.oasis->
 883 [open.org/committees/download.php/20576/wsdm-muws1-1.1-spec-os-](http://www.oasis-)
 884 [01.pdf](http://www.oasis-)
- 885 [WSDM-MUWS2] V. Bullard, W. Vambenepe, "OASIS Web Services Distributed
 886 Management: Management Using Web Services (MUWS 1.1) Part 2",
 887 August 2006, <http://www.oasis->
 888 [open.org/committees/download.php/20575/wsdm-muws2-1.1-spec-os-](http://www.oasis-)
 889 [01.pdf](http://www.oasis-)

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918 **12. Change History**

919 **12.1 13 August 2018**

920 - Interim draft revision (Ira McDonald).

921 - Revised section 5.2 Table 2 MFD and Printer Subunit Alerts, to add 15 new Marker
922 Supplies alerts, per Lee Hills (Xerox) and Mike Sweet (Apple).

923 - Revised section 5.3 Table 3 IPP printer-state-reasons, to correct numeric values for
924 several Scanner alerts (per Table 2) and add “scannerSensorMissing(5114)”, per Rick
925 Yardumian (Canon).

926 - Revised section 5.3 Table 3 IPP printer-state-reasons, to add 15 new Marker Supplies
927 alerts, per Lee Hills (Xerox) and Mike Sweet (Apple).

928 - Revised section 9.2 Alert Codes, to add new Marker Supplies and Scanner alerts (per
929 Table 2), per Lee Hills (Xerox), Rick Yardumian (Canon), and Mike Sweet (Apple).

930 - Revised section 9.3 IPP Attribute and Keyword Value Registrations, to add new Marker
931 Supplies and Scanner alerts (per Table 3), per Lee Hills (Xerox), Rick Yardumian (Canon),
932 and Mike Sweet (Apple).

933 - Revised sections 9.x to correct registration procedure references in RFC 8011.

934 - Deleted section 9.9 Semantic Model Registrations (no longer relevant).

935 - Revised section 10.1 Normative References, to add “STD92” for RFC 8010/8011 and
936 delete PWG 5108.07 (no longer relevant).

937 **12.112.2 9 February 2018**

938 - Initial draft revision (Smith Kennedy).

939 - Converted original version to current PWG document template.