PWG MFD Alerts v1.1

(MFD Alerts)

Status: Approved

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].

This document is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see:

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

This document is available electronically at:

<https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmfdalerts11-20190412-5017.3.docx>

<https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmfdalerts11-20190412-5017.3.pdf>

Copyright © 2012-2019 The Printer Working Group. All rights reserved.

This document may be copied and furnished to others, and derivative works that comment on, or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice, this paragraph and the title of the Document as referenced below are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the IEEE-ISTO and the Printer Working Group, a program of the IEEE-ISTO.

Title: PWG MFD Alerts v1.1 (MFD Alerts)

The IEEE-ISTO and the Printer Working Group DISCLAIM ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED INCLUDING (WITHOUT LIMITATION) ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The Printer Working Group, a program of the IEEE-ISTO, reserves the right to make changes to the document without further notice. The document may be updated, replaced or made obsolete by other documents at any time.

The IEEE-ISTO takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights.

The IEEE-ISTO invites any interested party to bring to its attention any copyrights, patents, or patent applications, or other proprietary rights which may cover technology that may be required to implement the contents of this document. The IEEE-ISTO and its programs shall not be responsible for identifying patents for which a license may be required by a document and/or IEEE-ISTO Industry Group Standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention. Inquiries may be submitted to the IEEE-ISTO by e-mail at: ieee-isto@ieee.org.

The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its designees) is, and shall at all times, be the sole entity that may authorize the use of certification marks, trademarks, or other special designations to indicate compliance with these materials.

Use of this document is wholly voluntary. The existence of this document does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to its scope.

**About the IEEE-ISTO**

The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards, but also to facilitate activities that support the implementation and acceptance of standards in the marketplace. The organization is affiliated with the IEEE (<http://www.ieee.org/>) and the IEEE Standards Association ([http://standards.ieee.org/)](http://standards.ieee.org/%29).

For additional information regarding the IEEE-ISTO and its industry programs visit:

<http://www.ieee-isto.org>

**About the IEEE-ISTO PWG**

The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including printer manufacturers, print server developers, operating system providers, network operating system providers, network connectivity vendors, and print management application developers. The group is chartered to make printers and the applications and operating systems supporting them work together better. All references to the PWG in this document implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.” In order to meet this objective, the PWG will document the results of their work as open standards that define print related protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from the interoperability provided by voluntary conformance to these standards.

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

For additional information regarding the Printer Working Group visit:

[https://www.pwg.org](https://www.pwg.org/)

Contact information:

The Printer Working Group

c/o The IEEE Industry Standards and Technology Organization

445 Hoes Lane

Piscataway, NJ 08854

USA

Table of Contents

[1. Introduction 6](#_Toc7086838)

[2. Terminology 6](#_Toc7086839)

[2.1 Conformance Terminology 6](#_Toc7086840)

[2.2 Printing Terminology 6](#_Toc7086841)

[2.3 Protocol Role Terminology 7](#_Toc7086842)

[2.4 Acronyms and Organizations 7](#_Toc7086843)

[3. Requirements 8](#_Toc7086844)

[3.1 Rationale 8](#_Toc7086845)

[3.2 Use Cases 8](#_Toc7086846)

[3.2.1 MFDs with OEM Components 8](#_Toc7086847)

[3.2.2 MFDs with Alert Messages 9](#_Toc7086848)

[3.3 Exceptions 9](#_Toc7086849)

[3.4 Out of Scope 9](#_Toc7086850)

[3.5 Design Requirements 9](#_Toc7086851)

[4. SNMP Printer Model Extensions 10](#_Toc7086852)

[4.1 ScanDevice 10](#_Toc7086853)

[4.2 FaxDevice 10](#_Toc7086854)

[4.3 OutputChannel 10](#_Toc7086855)

[5. MFD Alerts 10](#_Toc7086856)

[5.1 MFD Subunit Alert Groups 10](#_Toc7086857)

[5.2 MFD Subunit Alerts 11](#_Toc7086858)

[5.3 IPP printer-state-reasons (1setOf type2 keyword) 13](#_Toc7086859)

[6. Conformance Requirements 15](#_Toc7086860)

[6.1 SNMP Agent Conformance Requirements 15](#_Toc7086861)

[6.2 SNMP Client Conformance Requirements 15](#_Toc7086862)

[6.3 IPP Printer Conformance Requirements 16](#_Toc7086863)

[6.4 IPP Client Conformance Requirements 16](#_Toc7086864)

[7. Internationalization Considerations 17](#_Toc7086865)

[7.1 IPP Internationalization Considerations 17](#_Toc7086866)

[7.2 SNMP Internationalization Considerations 17](#_Toc7086867)

[8. Security Considerations 18](#_Toc7086868)

[8.1 IPP Security Considerations 18](#_Toc7086869)

[8.2 SNMP Security Considerations 18](#_Toc7086870)

[9. IANA and PWG Considerations 18](#_Toc7086871)

[9.1 Alert Groups 18](#_Toc7086872)

[9.2 Alert Codes 19](#_Toc7086873)

[9.3 IPP type2 keyword Value Registrations 20](#_Toc7086874)

[10. Overview of Changes 22](#_Toc7086875)

[10.1 PWG MFD Alerts v1.1 22](#_Toc7086876)

[11. References 23](#_Toc7086877)

[11.1 Normative References 23](#_Toc7086878)

[11.2 Informative References 24](#_Toc7086879)

[12. Author’s Address 25](#_Toc7086880)

List of Tables

Table 1: MFD Alert Groups 10

Table 2: MFD Subunit Alerts 11

Table 3: IPP MFD printer-state-reasons 13

1. Introduction

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

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

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

1. Terminology
	1. Conformance Terminology

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

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

* 1. Printing Terminology

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

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

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

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

*Output Device*: a single Logical or Physical Device

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

* 1. Protocol Role Terminology

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

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

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

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

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

* 1. Acronyms and Organizations

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

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

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

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

1. Requirements
	1. Rationale

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

1. An abstract model of a PrintDevice in section 2.2 of the IETF Printer MIB v2 [RFC3805].
2. An SNMP Alert table for a PrintDevice to support the service and maintenance functions in section 2.2.13 of the IETF Printer MIB v2 [RFC3805].
3. A set of design goals for status monitoring in a printing protocol in section 3.1.3 “Viewing the status and capabilities of a printer” (for End User), section 3.2.1 “Alerting” (for Operator), and section 3.3 “Administrator” (the bullet requirement to “administrate billing or other charge-back mechanisms”) of the IETF IPP Design Goals [RFC2567].
4. A set of MFD service types for Imaging Systems in the JmJobServiceTypesTC textual convention in section 4 of the IETF Job Monitoring MIB [RFC2707].
5. An abstract model of an MFD job in section 2 of the IETF Job Monitoring MIB [RFC2707].
6. An abstract model of an MFD in the PWG MFD Model and Common Semantics [PWG5108.1].

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

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

* 1. Use Cases
		1. MFDs with OEM Components

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

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

* + 1. MFDs with Alert Messages

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

* 1. Exceptions

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

* 1. Out of Scope

The following are considered out of scope for this specification:

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

The design requirements for this specification are:

1. Define a set of alert groups to provide alert capability for MFDs equivalent to the capability currently provided for printers for registration in the PrtAlertGroupTC in the IANA Printer MIB [IANAPRT];
2. Define new alert groups for MFD components only where functionally equivalent groups do not already exist for the PrintDevice(for example, a ScanMediaPath is inherently entirely separate from any print MediaPath);
3. Do not define new alert groups for MFD components where functionally equivalent groups already exist for the PrintDevice(for example, ScanDevice covers should be modeled using the existing Cover group);
4. Define a set of component-specific alerts for new ScanDevice and FaxDevice components for registration in the PrtAlertCodeTC in the IANA Printer MIB [IANAPRT]; and
5. Define a set of component-specific extension alerts for existing Input, Output, and MediaPath alert groups that correspond to extensions for the ScanMediaPath alert group.
6. SNMP Printer Model Extensions

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

* 1. ScanDevice

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

* 1. FaxDevice

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

* 1. OutputChannel

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

1. MFD Alerts
	1. MFD Subunit Alert Groups

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

Table 1: MFD Alert Groups

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

* 1. MFD Subunit Alerts

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

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

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 |
| 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 |
| faxModemNoDialTone | 6113 |
| faxModemLineBusy | 6114 |
| faxModemNoAnswer | 6115 |
| faxModemVoiceDetected | 6116 |
| faxModemCarrierLost | 6117 |
| faxModemTrainingFailure | 6118 |

Note: SNMP Printer subunit alert codes ending in “Error” only occur when the MFD/Printer is stopped.

* 1. IPP printer-state-reasons (1setOf type2 keyword)

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

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 |  |
| 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) |  |
| faxModemNoAnswer(6115) |  |
| faxModemVoiceDetected(6116) |  |
| faxModemCarrierLost(6117) |  |
| faxModemTrainingFailure(6118) |  |

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

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

1. Conformance Requirements
	1. SNMP Agent Conformance Requirements

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

1. MUST implement the prtAlertTable defined in IETF Printer MIB v2;
2. SHOULD implement the prtAlertTable defined in IETF Printer MIB v2 [RFC3805] as persistent across power cycles and hardware reconfigurations, for reliable fleet management.
3. MUST support the MFD alert groups defined in section 5.1 of this specification which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the MFD;
4. MUST support the MFD alert codes defined in section 5.2 of this specification which are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the MFD; and
5. MUST encode and interpret values of the prtAlertGroup and prtAlertCode objects defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer MIB [IANAPRT].
	1. SNMP Client Conformance Requirements

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

1. MUST support the prtAlertTable defined in IETF Printer MIB v2;
2. MUST support the MFD alert groups defined in section 5.1 of this specification which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the SNMP Client;
3. MUST support the MFD alert codes defined in section 5.2 of this specification which are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT], if the corresponding functionality (e.g., scan) is supported on the SNMP Client; and
4. MUST decode and interpret values of the prtAlertGroup and prtAlertCode objects defined in IETF Printer MIB v2 [RFC3805] according to the registry in IANA Printer MIB [IANAPRT].
	1. IPP Printer Conformance Requirements

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

1. MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes defined in PWG IPP Printer State Extensions [PWG5100.9];
2. MUST support the MFD alert groups defined in section 5.1 of this specification which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is supported on the MFD;
3. MUST support the MFD alert codes defined in section 5.2 of this specification which are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP] for keyword values in “printer-alert” and “printer-state-reasons”, if the corresponding functionality (e.g., scan) is supported on the MFD; and
4. MUST encode and interpret values of “printer-alert” and “printer-state-reasons” according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP].
	1. IPP Client Conformance Requirements

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

1. MUST support the IPP Printer “printer-alert” and “printer-alert-description” attributes defined in PWG IPP Printer State Extensions [PWG5100.9];
2. MUST support the MFD alert groups defined in section 5.1 of this specification which are registered in PrtAlertGroupTC in IANA Printer MIB [IANAPRT] for keyword values in “printer-alert”, if the corresponding functionality (e.g., scan) is supported on the IPP Client;
3. MUST support the MFD alert codes defined in section 5.2 of this specification which are registered in PrtAlertCodeTC in IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP] for keyword values in “printer-alert” and “printer-state-reasons”, if the corresponding functionality (e.g., scan) is supported on the IPP Client; and
4. MUST decode and interpret values of “printer-alert” and “printer-state-reasons” according to the IANA Printer MIB [IANAPRT] and IANA IPP Registry [IANAIPP].
5. Internationalization Considerations
	1. IPP Internationalization Considerations

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

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

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

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

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

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

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

* Unicode Character Encoding Model [UTR17] – multi-layer character model
* Unicode Character Property Model [UTR23] – character properties
* Unicode Conformance Model [UTR33] – Unicode conformance basis
	1. SNMP Internationalization Considerations

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

1. Security Considerations
	1. IPP Security Considerations

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

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

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

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

* Unicode Security FAQ [UNISECFAQ] – common Unicode security issues
	1. SNMP Security Considerations

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

1. IANA and PWG Considerations
	1. Alert Groups

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

 -- Values for the ScanDevice

 scanDevice(50), -- MFD Extension

 scanner(51), -- MFD Extension

 scanMediaPath(52), -- MFD Extension

 -- Values (50) to (59) reserved for the ScanDevice

 -- Values for the FaxDevice

 faxDevice(60), -- MFD Extension

 faxModem(61), -- MFD Extension

 -- Values (60) to (69) reserved for the FaxDevice

 -- Values for other common subunits

 outputChannel(70), -- MFD Extension

 -- Values (70) to (79) reserved for common subunits

* 1. Alert Codes

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

 -- Input Group

 inputMediaTrayFeedError(814),

 inputMediaTrayJam(815),

 inputMediaTrayFailure(816),

 inputMediaTrayPickRollerLifeWarn(817),

 inputMediaTrayPickRollerLifeOver(818),

 inputMediaTrayPickRollerFailure(819),

 inputMediaTrayPickRollerMissing(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).

 markerTonerMissing(1130).

 -- Media Path Group

 mediaPathFailure(1305),

 mediaPathJam(1306),

 mediaPathInputRequest(1310),

 mediaPathInputFeedError(1311),

 mediaPathInputJam(1312),

 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),

 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), -- DEPRECATED

 faxModemProtocolAlert(6111), -- DEPRECATED

 faxModemEquipmentFailure(6112), -- DEPRECATED

 faxModemNoDialTone(6113), -- DEPRECATED

 faxModemLineBusy(6114), -- DEPRECATED

 faxModemNoAnswer(6115), -- DEPRECATED

 faxModemVoiceDetected(6116), -- DEPRECATED

 faxModemCarrierLost(6117), -- DEPRECATED

 faxModemTrainingFailure(6118), -- DEPRECATED

* 1. IPP type2 keyword Value Registrations

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

The registry entry will contain the following information:

Attribute Name (attribute syntax) Reference

--------------------------------- ---------

printer-state-reasons (1setOf type2 keyword) [STD92]

 input-media-tray-feed-error [PWG5107.3]

 input-media-tray-jam [PWG5107.3]

 input-media-tray-failure [PWG5107.3]

 input-pick-roller-life-warn [PWG5107.3]

 input-pick-roller-life-over [PWG5107.3]

 input-pick-roller-failure [PWG5107.3]

 input-pick-roller-missing [PWG5107.3]

 output-media-tray-feed-error [PWG5107.3]

 output-media-tray-jam [PWG5107.3]

 output-media-tray-failure [PWG5107.3]

 marker-cleaner-missing [PWG5107.3]

 marker-developer-missing [PWG5107.3]

 marker-fuser-missing [PWG5107.3]

 marker-ink-missing [PWG5107.3]

 marker-opc-missing [PWG5107.3]

 marker-print-ribbon-missing [PWG5107.3]

 marker-supply-almost-empty [PWG5107.3]

 marker-supply-empty [PWG5107.3]

 marker-supply-missing [PWG5107.3]

 marker-waste-almost-full [PWG5107.3]

 marker-waste-full [PWG5107.3]

 marker-waste-missing [PWG5107.3]

 marker-waste-ink-receptacle-missing [PWG5107.3]

 marker-waste-toner-receptacle-missing [PWG5107.3]

 marker-toner-missing [PWG5107.3]

 media-path-failure [PWG5107.3]

 media-path-jam [PWG5107.3]

 media-path-input-request [PWG5107.3]

 media-path-input-feed-error [PWG5107.3]

 media-path-input-jam [PWG5107.3]

 media-path-input-empty [PWG5107.3]

 media-path-output-feed-error [PWG5107.3]

 media-path-output-jam [PWG5107.3]

 media-path-output-full [PWG5107.3]

 media-path-pick-roller-life-warn [PWG5107.3]

 media-path-pick-roller-life-over [PWG5107.3]

 media-path-pick-roller-failure [PWG5107.3]

 media-path-pick-roller-missing [PWG5107.3]

 scanner-light-life-almost-over [PWG5107.3]

 scanner-light-life-over [PWG5107.3]

 scanner-light-failure [PWG5107.3]

 scanner-light-missing [PWG5107.3]

 scanner-sensor-life-almost-over [PWG5107.3]

 scanner-sensor-life-over [PWG5107.3]

 scanner-sensor-failure [PWG5107.3]

 scanner-sensor-missing [PWG5107.3]

 scan-media-path-tray-missing [PWG5107.3]

 scan-media-path-tray-almost-full [PWG5107.3]

 scan-media-path-tray-full [PWG5107.3]

 scan-media-path-failure [PWG5107.3]

 scan-media-path-jam [PWG5107.3]

 scan-media-path-input-request [PWG5107.3]

 scan-media-path-input-feed-error [PWG5107.3]

 scan-media-path-input-jam [PWG5107.3]

 scan-media-path-output-feed-error [PWG5107.3]

 scan-media-path-output-jam [PWG5107.3]

 scan-media-path-output-full [PWG5107.3]

 scan-media-path-pick-roller-life-warn [PWG5107.3]

 scan-media-path-pick-roller-life-over [PWG5107.3]

 scan-media-path-pick-roller-failure [PWG5107.3]

 scan-media-path-pick-roller-missing [PWG5107.3]

 fax-modem-missing [PWG5107.3]

 fax-modem-life-almost-over [PWG5107.3]

 fax-modem-life-over [PWG5107.3]

 fax-modem-turned-on [PWG5107.3]

 fax-modem-turned-off [PWG5107.3]

1. Overview of Changes
	1. PWG MFD Alerts v1.1

The following changes were made to the previous version of this specification [PWG5107.3-2012]:

* Changed document title to “PWG MFD Alerts”;
* Revised and simplified Abstract and section 1 Introduction;
* Revised section 2.3 Protocol Role Terminology to change “Client” to “IPP Client”, change “Printer” to “IPP Printer”, change “Printer MIB Agent” to “SNMP Printer”, and change “Printer MIB Client” to “SNMP Client”;
* Deleted section 3.2.3 MFDs with Web-based Fleet Management use case (out-of-scope);
* Added section 3.3 Exceptions to say there are no significant exceptions;
* Revised section 6 Conformance Requirements to clearly separate SNMP Printer MIB requirements from IPP requirements;
* Revised Table 2 MFD Subunit Alerts to add missing Marker Supplies alerts and add note about “Error” suffix only to be used when MFD/Printer is stopped;
* Revised Table 3 IPP MFD printer-state-reasons to add missing Marker Supplies alerts, correct numeric values for several Scanner alerts (per Table 2), add “scannerSensorMissing(5114)”, and add notes about “error” suffix only to be used when MFD/Printer is stopped and non-mapping of transient FaxModem alerts to IPP;
* Revised section 9 IANA Considerations to add missing Marker Supplies alerts and suffix “—DEPRECATED” to all of the Printer MIB FaxModem transient alerts (NOT mapped to IPP); and
* Revised section 11 References to remove unused references and point to the current versions of referenced documents and specifications at the time of publication.
1. References
	1. Normative References

[BCP14] S. Bradner, “Key words for use in RFCs to Indicate Requirement Levels", RFC 2119/RFC8174 / BCP 14, March 1997 and May 2017, <https://tools.ietf.org/html/bcp14>

[IANAIPP] "IANA IPP Registry", IANA Registry, <https://www.iana.org/assignments/ipp-registrations>

[IANAPRT] "IANA Printer MIB", IANA Registry, <https://www.iana.org/assignments/ianaprinter-mib>

[ISO10646] "Information technology -- Universal Coded Character Set (UCS)", ISO/IEC 10646:2011

[RFC3805] R. Bergman, H. Lewis, I. McDonald, “IETF Printer MIB v2”, RFC 3805, June 2004, <https://tools.ietf.org/html/rfc3805>

[RFC3806] R. Bergman, H. Lewis, I. McDonald, "Printer Finishing MIB", RFC 3806, June 2004, <https://tools.ietf.org/html/rfc3806>

[RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange", RFC 5198, March 2008, <https://tools.ietf.org/html/rfc5198>

[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>

[STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, <https://tools.ietf.org/html/std63>

[STD66] T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", RFC 3986/STD 66, January 2005, <https://tools.ietf.org/html/std66>

[STD92] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", RFC 8010/RFC 8011 / STD 92, June 2018, <https://tools.ietf.org/html/std92>

[UAX9] Unicode Consortium, “Unicode Bidirectional Algorithm”, UAX#9, May 2018,
<https://www.unicode.org/reports/tr9/>

[UAX14] Unicode Consortium, “Unicode Line Breaking Algorithm”, UAX#14, May 2018,
<https://www.unicode.org/reports/tr14/>

[UAX15] Unicode Consortium, “Normalization Forms”, UAX#15, May 2018,
<https://www.unicode.org/reports/tr15/>

[UAX29] Unicode Consortium, “Unicode Text Segmentation”, UAX#29, May 2018,
<https://www.unicode.org/reports/tr29/>

[UAX31] Unicode Consortium, “Unicode Identifier and Pattern Syntax”, UAX#31, June 2018,
<https://www.unicode.org/reports/tr31/>

[UNICODE] Unicode Consortium, "Unicode Standard", Version 11.0.0, June 2018,
<https://www.unicode.org/versions/Unicode11.0.0/>

[UTS10] Unicode Consortium, “Unicode Collation Algorithm”, UTS#10, May 2018,
<https://www.unicode.org/reports/tr10/>

[UTS35] Unicode Consortium, “Unicode Locale Data Markup Language”, UTS#35, October 2018,
<https://www.unicode.org/reports/tr35/>

[UTS39] Unicode Consortium, “Unicode Security Mechanisms”, UTS#39, May 2018,
<https://www.unicode.org/reports/tr39>/

* 1. Informative References

[RFC1759] R. Smith, F. Wright, T. Hastings, S. Zilles, J. Gyllenskog, “IETF Printer MIB”, RFC 1759, March 1995, <https://tools.ietf.org/html/rfc1759>

[RFC2567] F.D. Wright, "IETF Design Goals for an Internet Printing Protocol", RFC 2567, April 1999, <https://tools.ietf.org/html/rfc2567>

[RFC2707] R. Bergman, T. Hastings, S. Isaacson, H. Lewis, "IETF Job Monitoring MIB - V1.0", RFC 2707, September 1999, <https://tools.ietf.org/html/rfc2707>

[UTR17] Unicode Consortium “Unicode Character Encoding Model”, UTR#17, November 2008,
<https://www.unicode.org/reports/tr17>/

[UTR23] Unicode Consortium “Unicode Character Property Model”, UTR#23, May 2015,
<https://www.unicode.org/reports/tr23>/

[UTR33] Unicode Consortium “Unicode Conformance Model”, UTR#33, November 2008,
<https://www.unicode.org/reports/tr33>/

[UNISECFAQ] Unicode Consortium “Unicode Security FAQ”, November 2016,
<https://www.unicode.org/faq/security.html>

1. Author’s Address

Ira McDonald

High North Inc

PO Box 221

Grand Marais, MI 49839

Phone: 906-494-2434

Email: blueroofmusic@gmail.com

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

Charles Baxter Xerox

Ron Bergman (original Author)

John Boyd Toshiba

Lee Farrell

Walt Filbrich

Gail Giansiracusa Kyocera Document Solutions

Smith Kennedy HP Inc.

Sheng Lee Toshiba

Harry Lewis

Christopher Rizzo Xerox

Stuart Rowley InfoPrint Solutions

Michael Sweet Apple

Ole Skov MPI Tech

Thomas Silver Xerox

Jerry Thrasher

Paul Tykodi Tykodi Consulting Services

Bill Wagner TIC

Craig Whittle

Rick Yardumian Canon

Peter Zehler Xerox