[PWG IPP Printer State Exts (7 November 2006)](#)

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Printer Working Group

Internet Printing Protocol (IPP)

Printer State Extensions v1.0

Working Draft

Status: Prototype

7 November 2006

Abstract

This document defines two new IPP Printer attributes "printer-alert" and "printer-alert-description" plus extensions to the IPP Printer attribute "printer-state-reasons" (defined in RFC 2911) and to the IANA Printer MIB textual convention "PrtAlertCodeTC" (originally published in RFC 3805) as follows:

- (a) A standard encoding of all of the machine-readable columnar objects in the 'prtAlertTable' defined in IETF Printer MIB v2 (RFC 3805) into substrings of values of the new IPP Printer "printer-alert" attribute defined in this document.

- (b) A standard encoding of the localized 'prtAlertDescription' columnar object in the 'prtAlertTable' defined in IETF Printer MIB v2 (RFC 3805) into values of the new IPP Printer "printer-alert-description" attribute defined in this document.

- (c) A standard mapping between the device errors and warnings in the 'PrtAlertCodeTC' textual convention defined in IANA Printer MIB and existing or new values (as needed) of the IPP Printer "printer-state-reasons" attribute defined in IPP/1.1.

- (d) A standard mapping between the finishing subunit types in the 'FinDeviceTypeTC' textual convention defined in IANA Finisher MIB (originally published in RFC 3806) and new specific values of the 'PrtAlertCodeTC' textual convention defined in IANA Printer MIB and new values of the IPP Printer "printer-state-reasons" attribute defined in IPP/1.1, for high fidelity support of finishing alerts.

This document is available at:

ftp://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippstate10-20061107.htm

Title: PWG IPP Printer State Reasons Extensions v1.0

About the IEEE-ISTO

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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.

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Instructions for subscribing to the IPP WG mailing list can be found at:

http://www.pwg.org/mailhelp.html

Members of the PWG and interested parties are encouraged to join the IPP WG mailing list in order to participate in any discussions, clarifications, or review of this specification. Note that, to reduce spam, mail from a non-subscriber is forwarded to the Moderator of the IPP WG mailing list, so you should subscribe to the mailing list before sending a question or comment to the mailing list.

1 Introduction

Note: Open issues in this document are introduced by '[[Editor:'.

This document defines two new IPP Printer attributes "printer-alert" and "printer-alert-description" plus extensions to the IPP Printer attribute "printer-state-reasons" (defined in RFC 2911) and to the IANA Printer MIB textual convention "PrtAlertCodeTC" (originally published in RFC 3805) as follows:

- ○ (a) A standard encoding of all of the machine-readable columnar objects in the 'prtAlertTable' defined in IETF Printer MIB v2 (RFC 3805) into substrings of values of the new IPP Printer "printer-alert" attribute defined in this document.

- ○ (b) A standard encoding of the localized 'prtAlertDescription' columnar object in the 'prtAlertTable' defined in IETF Printer MIB v2 (RFC 3805) into values of the new IPP Printer "printer-alert-description" attribute defined in this document.

- ○ (c) A standard mapping between the device errors and warnings in the 'PrtAlertCodeTC' textual convention defined in IANA Printer MIB and existing or new values (as needed) of the IPP Printer "printer-state-reasons" attribute defined in IPP/1.1.

- ○ (d) A standard mapping between the finishing subunit types in the 'FinDeviceTypeTC' textual convention defined in IANA Finisher MIB (originally published in RFC 3806) and new specific values of the 'PrtAlertCodeTC' textual convention defined in IANA Printer MIB and new values of the IPP Printer "printer-state-reasons" attribute defined in IPP/1.1, for high fidelity support of finishing alerts.

1.1 Problem Statement

When deploying printers in enterprise networks, customers often disable SNMPv1 (RFC 1157), based on local security policy - and secure SNMPv3 (RFC 3414) is not widely supported by current printers. Therefore, alternative support for secure queries for printer device alerts is required to manage, provision, and service these non-SNMP network printers. IPP/1.1 (RFC 2911) can be securely deployed in enterprise networks, using TLS/1.0 (RFC 2246) and HTTP/1.1 Upgrade (RFC 2817), so an IPP solution to this requirement is attractive.

The IPP "printer-state-reasons" attribute was defined in IPP/1.1 (RFC 2911), but the mapping of printer device alerts from the 'prtAlertCode' object defined in Printer MIB v1/v2 (RFC 1759/3805) was very sparse.

2 Terminology

2.1 Conformance Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as defined in [RFC2119].

2.2 Printing Terminology

Normative definitions and semantics of printing terms are imported from IETF Printer MIB v2

[RFC3805], IETF Finisher MIB [RFC3806], and IETF IPP/1.1 [RFC2911].

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

- ○ IPP Client - Initiator of outgoing IPP session requests and sender of outgoing and IPP operation requests (HTTP/1.0 Client [RFC1957] / HTTP/1.1 Client [RFC2616]).

- ○ IPP Printer - Listener for incoming IPP session requests and receiver of incoming IPP operation requests (HTTP/1.0 Server [RFC1957] / HTTP/1.1 Server [RFC2616]).

- ○ Printer MIB Agent - Receiver of incoming SNMP operation requests (SNMPv1 Agent [RFC1157] / SNMPv3 Command Responder [RFC3411]).

- ○ Printer MIB Client - Sender of outgoing SNMP operation requests (SNMPv1 Manager [RFC1157] / SNMPv3 Command Generator [RFC3411]).

3 Industry Standard Printing Model

3.1 Standard Model - ISO DPA

The industry standard printing model was first defined during the development of ISO Document Printing Application (DPA) [ISO10175]. All subsequent open printing standards refer extensively to ISO DPA for the semantics of printing attributes.

WARNING: In ISO DPA, the abstract Printer object has two distinct 'realizations', to whit, Physical Printer (device) and Logical Printer (service). As a result, the term 'Printer' was used to mean a Physical Print Device in the IETF Printer MIB v1/v2 [RFC1759] [RFC3805] and later ambiguously used to mean _either_ a Logical Print Service or a Physical Print Device in IETF IPP/1.1 [RFC2911].

3.2 Print Device - Printer MIB

The Print Device was first described in the IETF Host Resources MIB v1 [RFC1514] (September 1993) which defined the 'hrDevicePrinter' OID value for the 'hrDeviceType' element of the 'hrDeviceTable' and defined the 'hrPrinterTable' containing the 'hrPrinterStatus' (enumeration) and 'hrPrinterDetectedErrorState' (bit-mask) elements.

The industry standard Print Device model was later defined in section 2 of the IETF Printer MIB v1 [RFC1759] (March 1995) and is preserved without change in the IETF Printer MIB v2 [RFC3805] (June 2004). The block diagram is excerpted below.

```
            Figure 2 - Printer Block Diagram

                  Physical Connections
                          |
                    +-----------+
                    |           |
              +------------+    |
              |  Interface |-+
              |    MIB-II  |
              +------------+
                    |
              +-----------+
```

```
                      |     |
        +-------------+ |   +-----------+
        |  Channel    |-+   | Operator  |
        |             | |   |  Console  |
        +-------------+ |   +-----------+
                      |
              +-----------+
              |     |     |
 +----------+ +-----------+ |   +----------+ |
 | General  | | Interpreter |-+ |  Alerts  |-+
 | Printer  | |     |     | |   |          | |
 +----------+ +-----------+ |   +----------+ |
                      |
       +------------------------------+
       |       System Controller      |
       |       HOST-RESOURCES-MIB      |
       +------------------------------+

 +------+              +--------+              +--------+
 |      |              |        |              |        |
+-------+ |  +--------+ +---------+ | +-------+ +--------+ |
| Input |-+  +--------+| | Marker |-+ +--------+| | Output |-+
|  |===>|          |+<==>|        |<==>|        |+==>|        |
+-------+ +--+ +--+ +---------+   +--+ +--+ +--------+
    \         |  ||                 |  ||         \
     \        |  ||                 |  ||          \
      \  +--------+  | |+------------------------| |||     +---------+
       \ |        |  | +--------------------------+ |||    |         |
         +----------+ |  |       Media Path       |+|     +----------+ |
         | Media    |-+ +------------------------------+  | Finisher |-+
         |(optional)|   +------------------------------+  |(optional)|
         +----------+                                     +----------+
```
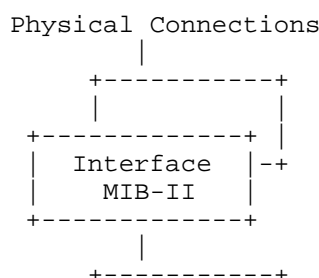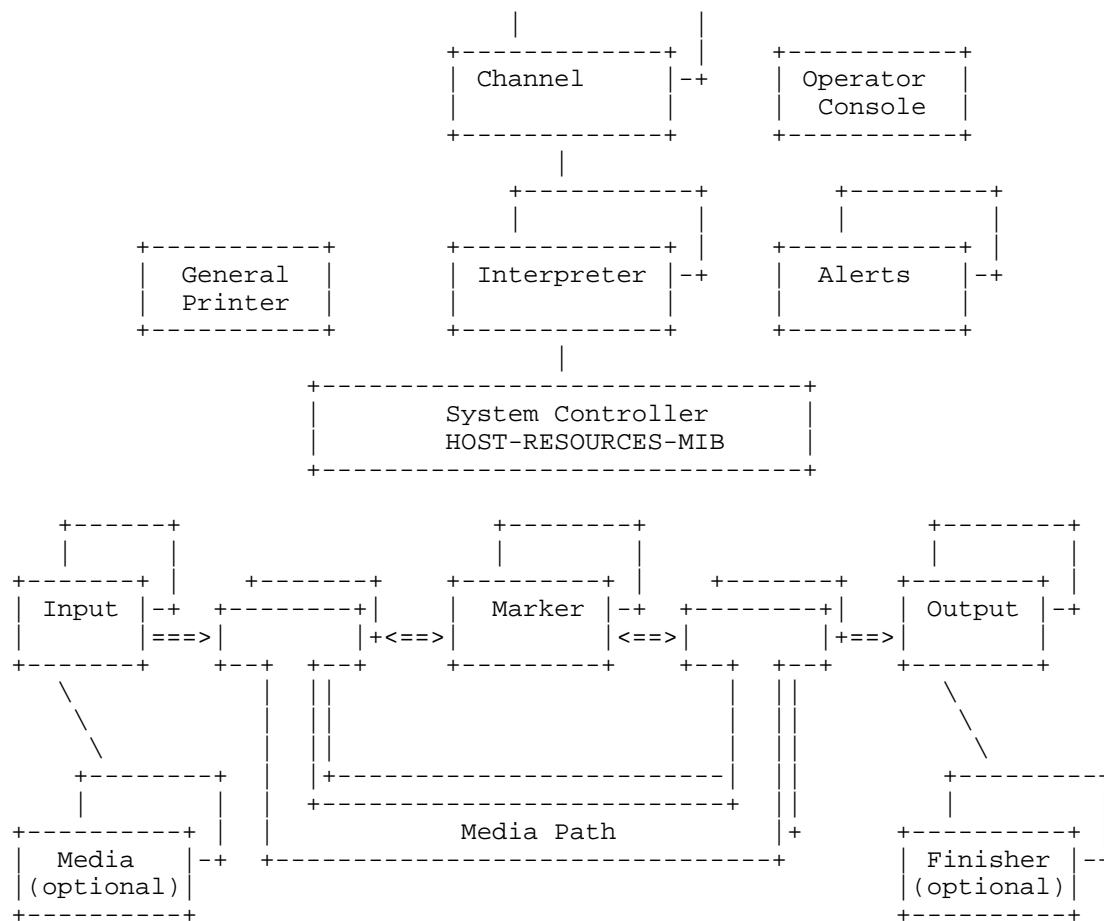
3.3 Print Service and Print Device - IPP

A simplified printing model was first defined in section 1.1 of IETF IPP/1.1 [RFC2911], based on ISO DPA [ISO10175]. The block diagram is excerpted below.

```
                            +-------------+
                            | Application |
              o             +. . . . . . .|
             \|/            |   Spooler   |
             / \            +. . . . . . .|   +---------+
           End-User         | Print Driver |---|  File   |
        +----------+ +-----+ +------+------+   +----+----+
        | Browser  | | GUI |        |              |
        +-----+----+ +--+--+        |              |
              |         |           |              |
              |    +----+-----------+---+          |
  N   D   S   |    |    IPP Client      |----------+
  O   I   E   |    +--------+---------+
  T   R   C   |             |
  I   E   U   |
  F   C   R   ------------- Transport -----------------
  I   T   I
  C   O   T              |      --+
  A   R   Y     +--------+--------+  |
  T   Y         |   IPP Server    |  |
  I             +--------+--------+  |
  O                      |          | IPP Printer
  N             +--------+--------+  |
                | Print Service   |  |
                +-----------------+  |
                         |      --+
```
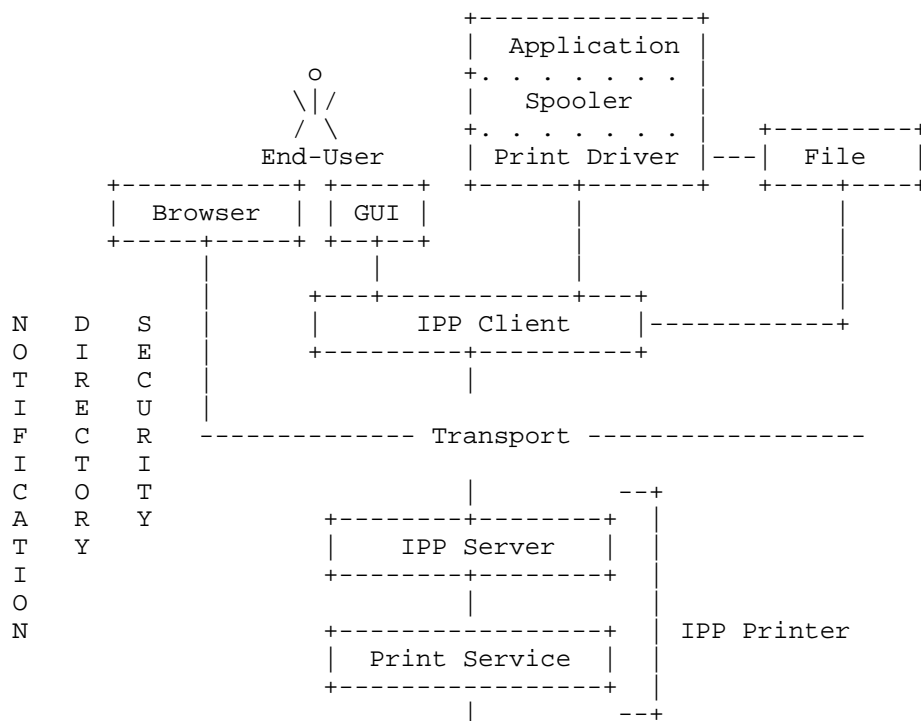
```
                         +----------------+
                         | Output Device(s)|
                         +----------------+
```

A simplified Print Service model and Print Device model was first defined in section 2.1 of IETF
IPP/1.1 [RFC2911], based on the logical and physical 'realizations' of the Printer object originally
defined in ISO DPA [ISO10175]. The term Printer was ambiguously used to mean _either_ a Logical
Print Service or a Physical Print Device in IETF IPP/1.1 [RFC2911]. The block diagrams are excerpted
below.

```
Legend:

#####  indicates a Printer object which is
       either embedded in an output device or is
       hosted in a server.  The Printer object
       might or might not be capable of queuing/spooling.

any    indicates any network protocol or direct
       connect, including IPP

embedded printer:

                                                output device
                                        +---------------+
 O   +--------+                         | ##########    |
/|\  | client |-----------IPP---------->#  Printer  #   |
/ \  +--------+                         |  # Object  #   |
                                        |  ##########    |
                                        +---------------+

hosted printer:

                                        +---------------+
 O   +--------+       ##########        |               |
/|\  | client |--IPP-->#  Printer #-any->|  output device |
/ \  +--------+       #  Object  #       |               |
                      ##########         +---------------+


                                         +---------------+
                                         |               |
fan out:                            +-->|  output device |
                                any/   |               |
 O   +--------+       ##########   /    +---------------+
/|\  | client |-IPP->#  Printer #--*
/ \  +--------+       #  Object  #   \    +---------------+
                      ########## any\  |               |
                                    +-->|  output device |
                                         |               |
                                         +---------------+
```
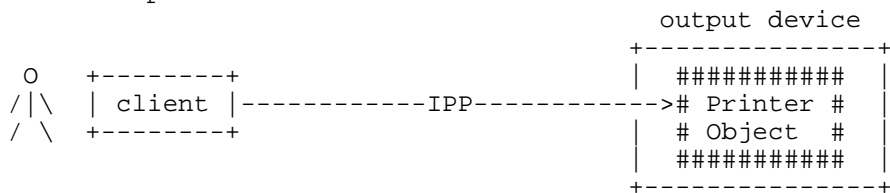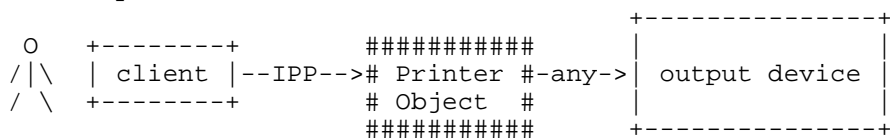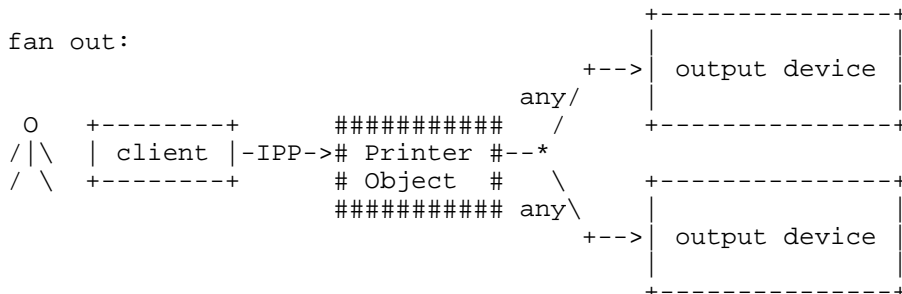
4 Requirements

4.1 Rationale for IPP PSX

IETF and PWG standards for the printing industry define:

- ○ (a) A rationale for an abstract model of printing (to support alternate encodings and protocols) in
  section 3 of the IETF IPP Rationale [RFC2568].

- ○ (b) 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].

○ (c) An abstract model of a Print Service (i.e., ISO DPA Logical Printer) and a Print Device (i.e., ISO DPA Physical Printer) in section 2.1 of IETF IPP/1.1 [RFC2911].

○ (d) A partial set of Print Device alerts in the "printer-state-reasons" attribute in section 4.4.12 of IETF IPP/1.1 [RFC2911].

○ (e) An abstract model of a Print Device and contained Subunits in section 2.2 of the IETF Printer MIB v2 [RFC3805].

○ (f) A set of Print Device and Subunit types in the 'PrtAlertGroupTC' textual convention in IANA Printer MIB [IANAPRT], originally published in section 5 of the IETF Printer MIB v2 [RFC3805].

○ (g) A set of Print Device and Subunit alerts in the 'PrtAlertCodeTC' textual convention in IANA Printer MIB [IANAPRT], originally published in section 5 of the IETF Printer MIB v2 [RFC3805].

○ (h) An abstract model of Finishing Subunits integrated into the Printer Model (from [RFC3805]) in section 3 of the IETF Finisher MIB [RFC3806].

○ (i) A set of Finishing Subunit types in the 'FinDeviceTypeTC' textual convention in IANA Finisher MIB [IANAFIN], originally published in section 7 of the IETF Finisher MIB [RFC3806].

When deploying printers in enterprise networks, customers often disable SNMPv1 (RFC 1157), based on local security policy - and secure SNMPv3 (RFC 3414) is not widely supported by current printers. Therefore, alternative support for secure queries for printer device alerts is required to manage, provision, and service these non-SNMP network printers. IPP/1.1 (RFC 2911) can be securely deployed in enterprise networks, using TLS/1.0 (RFC 2246) and HTTP/1.1 Upgrade (RFC 2817), so an IPP solution to this requirement is attractive.

The IPP "printer-state-reasons" attribute was defined in IPP/1.1 (RFC 2911), but the mapping of printer device alerts from the 'prtAlertCode' object defined in Printer MIB v1/v2 (RFC 1759/3805) was very sparse.

To support monitoring, maintenance, and administration of these network printers, this document defines:

○ (1) New enumerated values of the "PrtAlertCodeTC" textual convention for alerts for every Finishing Subunit type in the 'FinDeviceTypeTC' textual convention, for high fidelity alert mapping.

○ (2) New keyword values for the "printer-state-reasons" attribute to complete the mapping for every Print Device and Subunit alert in the 'PrtAlertCodeTC' textual convention.

○ (3) New keyword values for the new "printer-alert" attribute to encode all of the machine-readable columnar objects in 'prtAlertTable', for high fidelity alert mapping.

○ (4) A new "printer-alert-description" attribute to encode the localized 'prtAlertDescription' object in 'prtAlertTable', to complete the Printer MIB to IPP Printer mapping.

4.2 Use Models for IPP PSX

4.2.1 Service Providers - Monitoring

Outside service providers may lease and maintain network printers in remote customer enterprise networks in different administrative domains.

> Note: Typically monitoring proxies within customer enterprise networks are required for scalability of this use model. However, the deployment of monitoring proxies and of security credentials is outside the scope of this document.

- ○ (1) To support reordering of supplies, outside service providers may read Device and Subunit alerts in "printer-state-reasons" from network printers that support IPP/1.1 (e.g., every day).

- ○ (2) To support preventive maintenance, outside service providers may read Device and Subunit alerts in "printer-state-reasons" from network printers that support IPP/1.1 (e.g., every hour).

- ○ (3) To support downtime guarantees, outside service providers may periodically read Device and Subunit alerts in "printer-state-reasons" from network printers that support IPP/1.1 (e.g., every 10 minutes).

4.2.2 System Administrators - Network Management

Network system administrators configure and manage Print Devices in local enterprise networks.

- ○ (1) To support network management, network system administrators may subscribe to Print Device events from network printers that support IPP/1.1.

- ○ (2) To support preventive maintenance, network system administrators may read Device and Subunit alerts in "printer-state-reasons" from network printers that support IPP/1.1 (e.g., every hour).

- ○ (3) To support emergency maintenance, network system administrators may read Device and Subunit alerts in "printer-state-reasons", especially configuration changes and critical alerts, from network printers that support IPP/1.1 (e.g., every 10 minutes).

4.2.3 System Operators - Monitoring

Network system operators monitor Print Devices and manage Print Jobs in local enterprise networks.

- ○ (1) To support Print Job management, network system operators may subscribe to Print Device and Print Job events from network printers that support IPP/1.1.

- ○ (2) To support Print Device monitoring, network system operators may read Device and Subunit alerts in "printer-state-reasons", especially for low or empty supplies, from network printers that support IPP/1.1 (e.g., every hour).

- ○ (3) To support Print Device availability, network system operators may read Device and Subunit alerts in "printer-state-reasons", especially for paper jams and other simple alerts, from network printers that support IPP/1.1 (e.g., every 10 minutes).

4.3 Design Requirements for IPP PSX

○ (1) The IPP PSX design MUST follow the naming conventions defined in IETF IPP/1.1 [RFC2911], including keyword value case (lower) and hyphenation requirements.

○ (2) The IPP PSX design MUST define a complete mapping between Print Device and Subunit existing values of 'PrtAlertCodeTC' in IANA Printer MIB [IANAPRT] and existing values or new values (as needed) of "printer-state-reasons".

○ (3) The IPP PSX design MUST define Finishing Subunit-specific new values of 'PrtAlertCodeTC' for registration in IANA Printer MIB [IANAPRT] for every value of 'FinDeviceTypeTC' in IANA Finisher MIB [IANAFIN].

○ (4) The IPP PSX design MUST define a standard encoding for all of the machine-readable columnar objects defined in the 'prtAlertTable' in IETF Printer MIB v2 (RFC 3805) as substrings of values of a new "printer-alert" attribute.

○ (5) The IPP PSX design MUST define a standard encoding for the localized 'prtAlertDescription' columnar object defined in the 'prtAlertTable' in IETF Printer MIB v2 (RFC 3805) as text values of a new "printer-alert-description" attribute.

5 IPP Printer Attributes

5.1 printer-state-reasons (1setOf type2 keyword)

This document defines clarifications and extensions for the existing multi-valued IPP Printer "printer-state-reasons" attribute specified as REQUIRED in IETF IPP/1.1 [RFC2911].

5.1.1 Severity Suffixes Interoperability

The severity suffixes ('-report', '-error', and '-warning') for values of the existing IPP Printer "printer-state-reasons" attribute were defined in section 4.4.12 of IETF IPP/1.1 [RFC2911].

Note: Due to their optional presence, the severity suffixes of the existing IPP Printer "printer-state-reasons" attribute have NOT been IANA-registered because:

○ They are not valid for the attribute syntax 'keyword' defined in section 4.1.3 of [RFC2911].

○ They are structurally incompatible with the IANA IPP Registry [IANAIPP] defined in section 6 of [RFC2911].

5.1.1.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification SHOULD implement special-case parsing and validation for the severity suffixes for "printer-state-reasons" defined in [RFC2911].

5.1.2 Existing Printer State Reasons for Alert Codes

The table below shows existing values of "printer-state-reasons" [RFC2911] and their mapping from existing values of 'PrtAlertCodeTC' [IANAPRT].

Deprecated Mappings: Existing values of "printer-state-reasons" in Table 1 that are enclosed in parentheses are DEPRECATED and SHOULD NOT be implemented. Instead, the new specific mappings defined in Table 2 SHOULD be implemented.

Table 1 - Existing Printer State Reasons for Alert Codes

```
PrtAlertCodeTC                              printer-state-reasons
--------------                              --------------------
-- RFC 1759 Generic codes
other(1)                                    other
unknown(2)
coverOpen(3)                                cover-open
coverClosed(4)
interlockOpen(5)                            interlock-open
interlockClosed(6)
configurationChange(7)
jam(8)                                      media-jam

-- RFC 3805 Generic codes
subunitMissing(9)
subunitLifeAlmostOver(10)
subunitLifeOver(11)
subunitAlmostEmpty(12)
subunitEmpty(13)
subunitAlmostFull(14)
subunitFull(15)
subunitNearLimit(16)
subunitAtLimit(17)
subunitOpened(18)
subunitClosed(19)
subunitTurnedOn(20)
subunitTurnedOff(21)
subunitOffline(22)
subunitPowerSaver(23)
subunitWarmingUp(24)
subunitAdded(25)
subunitRemoved(26)
subunitResourceAdded(27)
subunitResourceRemoved(28)
subunitRecoverableFailure(29)
subunitUnrecoverableFailure(30)
subunitRecoverableStorageError(31)
subunitUnrecoverableStorageError(32)
subunitMotorFailure(33)
subunitMemoryExhausted(34)
subunitUnderTemperature(35)
subunitOverTemperature(36)
subunitTimingFailure(37)
subunitThermistorFailure(38)

-- General Printer Group
doorOpen(501)                               (door-open)
    -- DEPRECATED -- use coverOpen(3)
doorClosed(502)
    -- DEPRECATED -- use coverClosed(4)
powerUp(503)
powerDown(504)                              (shutdown)
printerNMSReset(505)
printerManualReset(506)
printerReadyToPrint(507)

-- Input Group
inputMediaTrayMissing(801)                  input-tray-missing
```

```
       inputMediaSizeChange(802)
       inputMediaWeightChange(803)
       inputMediaTypeChange(804)
       inputMediaColorChange(805)
       inputMediaFormPartsChange(806)
       inputMediaSupplyLow(807)                  media-low
       inputMediaSupplyEmpty(808)                media-empty
       inputMediaChangeRequest(809)              media-needed
       inputManualInputRequest(810)
       inputTrayPositionFailure(811)
       inputTrayElevationFailure(812)
       inputCannotFeedSizeSelected(813)

       -- Output Group
       outputMediaTrayMissing(901)               output-tray-missing
       outputMediaTrayAlmostFull(902)            output-area-almost-full
       outputMediaTrayFull(903)                  output-area-full
       outputMailboxSelectFailure(904)

       -- Marker Group
       markerFuserUnderTemperature(1001)         fuser-under-temp
       markerFuserOverTemperature(1002)          fuser-over-temp
       markerFuserTimingFailure(1003)
       markerFuserThermistorFailure(1004)
       markerAdjustingPrintQuality(1005)

       -- Marker Supplies Group
       markerTonerEmpty(1101)                    toner-empty
       markerInkEmpty(1102)                      (marker-supply-empty)
       markerPrintRibbonEmpty(1103)              (marker-supply-empty)
       markerTonerAlmostEmpty(1104)              toner-low
       markerInkAlmostEmpty(1105)                (marker-supply-low)
       markerPrintRibbonAlmostEmpty(1106)        (marker-supply-low)
       markerWasteTonerReceptacleAlmostFull(1107)
                                                 (marker-waste-almost-full)
       markerWasteInkReceptacleAlmostFull(1108)
                                                 (marker-waste-almost-full)
       markerWasteTonerReceptacleFull(1109)      (marker-waste-full)
       markerWasteInkReceptacleFull(1110)        (marker-waste-full)
       markerOpcLifeAlmostOver(1111)             opc-near-eol
       markerOpcLifeOver(1112)                   opc-life-over
       markerDeveloperAlmostEmpty(1113)          (marker-supply-low)
       markerDeveloperEmpty(1114)                (marker-supply-empty)
       markerTonerCartridgeMissing(1115)

       -- Media Path Group
       mediaPathMediaTrayMissing(1301)
       mediaPathMediaTrayAlmostFull(1302)
       mediaPathMediaTrayFull(1303)
       mediaPathCannotDuplexMediaSelected(1304)

       -- Interpreter Group
       interpreterMemoryIncrease(1501)
       interpreterMemoryDecrease(1502)
       interpreterCartridgeAdded(1503)
       interpreterCartridgeDeleted(1504)
       interpreterResourceAdded(1505)
       interpreterResourceDeleted(1506)
       interpreterResourceUnavailable(1507)    interpreter-resource-unavailable
       interpreterComplexPageEncountered(1509)

       -- Alert Group
       alertRemovalOfBinaryChangeEntry(1801)
           -- A binary change alert has been removed
```

5.1.2.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification MUST
implement the Table 1 standard mappings between existing values of "printer-state-reasons"
[RFC2911] and existing values of 'PrtAlertCodeTC' [IANAPRT].

○ (2) For interoperability, IPP implementations that claim conformance to this specification
SHOULD NOT implement the Table 1 deprecated mappings (enclosed in parentheses) between
existing values of "printer-state-reasons" [RFC2911] and existing values of 'PrtAlertCodeTC'
[IANAPRT]. Instead, the new specific mappings defined in Table 2 SHOULD be implemented.

5.1.3 New Printer State Reasons for Alert Codes

The table below defines new values of "printer-state-reasons" [RFC2911] and their mapping from
existing values of 'PrtAlertCodeTC' [IANAPRT].

Table 2 - New Printer State Reasons for Alert Codes

```
PrtAlertCodeTC                          printer-state-reasons
--------------                          --------------------
-- RFC 1759 Generic codes
other(1)                                ---
unknown(2)                              unknown
coverOpen(3)                            ---
coverClosed(4)                          cover-closed
interlockOpen(5)                        ---
interlockClosed(6)                      interlock-closed
configurationChange(7)                  configuration-change
jam(8)                                  ---

-- RFC 3805 Generic codes
subunitMissing(9)                       subunit-missing
subunitLifeAlmostOver(10)               subunit-life-almost-over
subunitLifeOver(11)                     subunit-life-over
subunitAlmostEmpty(12)                  subunit-almost-empty
subunitEmpty(13)                        subunit-empty
subunitAlmostFull(14)                   subunit-almost-full
subunitFull(15)                         subunit-full
subunitNearLimit(16)                    subunit-near-limit
subunitAtLimit(17)                      subunit-at-limit
subunitOpened(18)                       subunit-opened
subunitClosed(19)                       subunit-closed
subunitTurnedOn(20)                     subunit-turned-on
subunitTurnedOff(21)                    subunit-turned-off
subunitOffline(22)                      subunit-offline
subunitPowerSaver(23)                   subunit-power-saver
subunitWarmingUp(24)                    subunit-warming-up
subunitAdded(25)                        subunit-added
subunitRemoved(26)                      subunit-removed
subunitResourceAdded(27)                subunit-resource-added
subunitResourceRemoved(28)              subunit-resource-removed
subunitRecoverableFailure(29)           subunit-recoverable-failure
subunitUnrecoverableFailure(30)         subunit-unrecoverable-failure
subunitRecoverableStorageError(31)
                             subunit-recoverable-storage-error
subunitUnrecoverableStorageError(32)
                             subunit-unrecoverable-storage-error
subunitMotorFailure(33)                 subunit-motor-failure
subunitMemoryExhausted(34)              subunit-memory-exhausted
subunitUnderTemperature(35)             subunit-under-temperature
subunitOverTemperature(36)              subunit-over-temperature
subunitTimingFailure(37)                subunit-timing-Failure
subunitThermistorFailure(38)            subunit-thermistor-failure

-- General Printer Group
```

```
doorOpen(501)                           cover-open
    -- DEPRECATED -- use coverOpen(3)
doorClosed(502)                         cover-closed
    -- DEPRECATED -- use coverClosed(4)
powerUp(503)                            power-up
powerDown(504)                          power-down
printerNMSReset(505)                    printer-nms-reset
printerManualReset(506)                 printer-manual-reset
printerReadyToPrint(507)                printer-ready-to-print

-- Input Group
inputMediaTrayMissing(801)              ---
inputMediaSizeChange(802)               input-media-size-change
inputMediaWeightChange(803)             input-media-weight-change
inputMediaTypeChange(804)               input-media-type-change
inputMediaColorChange(805)              input-media-color-change
inputMediaFormPartsChange(806)          input-media-form-parts-change
inputMediaSupplyLow(807)                ---
inputMediaSupplyEmpty(808)              ---
inputMediaChangeRequest(809)            ---
inputManualInputRequest(810)            input-manual-input-request
inputTrayPositionFailure(811)           input-tray-position-failure
inputTrayElevationFailure(812)          input-tray-elevation-failure
inputCannotFeedSizeSelected(813)        input-cannot-feed-size-selected

-- Output Group
outputMediaTrayMissing(901)             ---
outputMediaTrayAlmostFull(902)          ---
outputMediaTrayFull(903)                ---
outputMailboxSelectFailure(904)         output-mailbox-select-failure

-- Marker Group
markerFuserUnderTemperature(1001)       ---
markerFuserOverTemperature(1002)        ---
markerFuserTimingFailure(1003)          marker-fuser-timing-failure
markerFuserThermistorFailure(1004)      marker-fuser-thermistor-failure
markerAdjustingPrintQuality(1005)       marker-adjusting-print-quality

-- Marker Supplies Group
markerTonerEmpty(1101)                  ---
markerInkEmpty(1102)                    marker-ink-empty
markerPrintRibbonEmpty(1103)            marker-print-ribbon-empty
markerTonerAlmostEmpty(1104)            ---
markerInkAlmostEmpty(1105)              marker-ink-almost-empty
markerPrintRibbonAlmostEmpty(1106)      marker-print-ribbon-almost-empty
markerWasteTonerReceptacleAlmostFull(1107)
                            marker-waste-toner-receptacle-almost-full
markerWasteInkReceptacleAlmostFull(1108)
                            marker-waste-ink-receptacle-almost-full
markerWasteTonerReceptacleFull(1109)
                            marker-waste-toner-receptacle-full
markerWasteInkReceptacleFull(1110)
                            marker-waste-ink-receptacle-full
markerOpcLifeAlmostOver(1111)           ---
markerOpcLifeOver(1112)                 ---
markerDeveloperAlmostEmpty(1113)        marker-developer-almost-empty
markerDeveloperEmpty(1114)              marker-developer-empty
markerTonerCartridgeMissing(1115)       marker-toner-cartridge-missing

-- Media Path Group
mediaPathMediaTrayMissing(1301)         media-path-media-tray-missing
mediaPathMediaTrayAlmostFull(1302)
                            media-path-media-tray-almost-full
mediaPathMediaTrayFull(1303)            media-path-media-tray-full
mediaPathCannotDuplexMediaSelected(1304)
                            media-path-cannot-duplex-media-selected

-- Interpreter Group
```

```
interpreterMemoryIncrease(1501)        interpreter-memory-increase
interpreterMemoryDecrease(1502)        interpreter-memory-decrease
interpreterCartridgeAdded(1503)        interpreter-cartridge-added
interpreterCartridgeDeleted(1504)      interpreter-cartridge-deleted
interpreterResourceAdded(1505)         interpreter-resource-added
interpreterResourceDeleted(1506)       interpreter-resource-deleted
interpreterResourceUnavailable(1507)   ---
interpreterComplexPageEncountered(1509)
                                interpreter-complex-page-encountered

-- Alert Group
alertRemovalOfBinaryChangeEntry(1801)
                                alert-removal-of-binary-change-entry
    -- A binary change alert has been removed
```

5.1.3.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification MUST implement the Table 2 standard mappings between new values of "printer-state-reasons" [RFC2911] and existing values of 'PrtAlertCodeTC' [IANAPRT].

5.1.4 New Printer State Reasons for Finishing Subunits

See Table 4 in section 6.1.1 'New Alert Codes for Finishing Subunits' that shows new values of "printer-state-reasons" [RFC2911] and their mapping from new values of 'PrtAlertCodeTC' [IANAPRT] for Finishing Subunits.

5.1.4.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification MUST implement the Table 4 standard mappings between new values of "printer-state-reasons" [RFC2911] and new values of 'PrtAlertCodeTC' [IANAPRT] for Finishing Subunits.

5.2 printer-alert (1setOf octetString(MAX))

This document defines the new multi-valued IPP Printer "printer-alert" attribute specified as RECOMMENDED by this document [PWG5100.x].
[[Editor: replace PWG5100.x w/ number of this document]]

5.2.1 Keywords for Alert Objects

The table below defines keywords for "printer-alert" for all of the machine-readable columnar objects in 'prtAlertTable' [RFC3805].

Note: The conformance levels in this table have been harmonized with:

○ (a) The bindings of the 'printerV2Alert' notification defined in IETF Printer MIB v2 [RFC3805];
○ (b) Section 9 'Event Notification Content' in IETF IPP Event Notifications and Subscriptions [RFC3995]; and
○ (c) DMTF/PWG Alliance work-in-progress CIM modelling of Printer MIB [WIMS-CIM].

Table 3 - Keywords for Alert Objects

```
Alert Object              Datatype     printer-alert tag   Conformance
------------              --------     -----------------   -----------
```

```
prtAlertCode                    String      code            REQUIRED
prtAlertIndex                   Integer     index           RECOMMENDED
prtAlertSeverityLevel           String      severity        RECOMMENDED
prtAlertTrainingLevel           String      training        OPTIONAL
prtAlertGroup                   String      group           RECOMMENDED
prtAlertGroupIndex              Integer     groupindex      RECOMMENDED
prtAlertLocation                Integer     location        RECOMMENDED
prtAlertTime                    Integer     time            OPTIONAL
```

5.2.1.1 Conformance

- (1) For interoperability, IPP implementations that claim conformance to this specification SHOULD implement the new RECOMMENDED IPP Printer "printer-alert" attribute.

- (2) For interoperability, IPP implementations that claim conformance to this specification and implement the new "printer-alert" attribute MUST implement the Table 3 standard mappings between keywords in "printer-alert" and existing labels of 'prtAlertTable' objects [RFC3805].

- (3) For interoperability, IPP implementations that claim conformance to this specification and implement the new "printer-alert" attribute MUST implement the Table 3 keywords defined as REQUIRED.

- (4) For interoperability, IPP implementations that claim conformance to this specification and implement the new "printer-alert" attribute SHOULD implement the Table 3 keywords defined as RECOMMENDED.

5.2.1.2 Rationale for Omission of prtAlertDescription

In this specification, a mapping of the human-readable, localized 'prtAlertDescription' object is NOT defined in "printer-alert", but rather in a separate new "printer-alert-description" attribute, for the following reasons:

- (1) To define such a mapping, where only _part_ of the resulting "printer-alert" attribute is localized, would be technically impossible to specify in ABNF [RFC4234].

- (2) To define such a mapping, without a fixed charset (because of localized content) would be technically impossible to specify in ABNF [RFC4234].

- (3) To implement such a mapping, if the value of the IPP Printer "charset-configured" attribute was different from the value of prtLocalizationCharacterSet selected by prtGeneralCurrentLocalization, would require that the IPP implementation performed (potentially lossy) charset conversion.

- (4) To implement such a mapping, if the value of the IPP Printer "natural-language-configured" attribute was different from the combined values of prtLocalizationLanguage and prtLocalizationCountry selected by prtGeneralCurrentLocalization, would require that the IPP implementation performed (potentially lossy) message translation.

5.2.2 Printer Alert Encoding of Alert Objects

Values of the new IPP Printer "printer-alert" attribute MUST be encoded using a visible subset of the [US-ASCII] charset. Control codes (0x00 to 0x1F and 0x7F) MUST NOT be used. The ABNF [RFC4234] below defines the standard encoding in "printer-alert" for all of the machine-readable

(non-localized) columnar objects in 'prtAlertTable' [RFC3805]:

```
printer-alert        = alert-code *[";" alert-element]
    ; set of alert elements encoded into one value

alert-code           = "code" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'coverOpen')
    ; 'prtAlertCode' in IETF Printer MIB v2 [RFC3805] mapped to label
    ; in 'PrtAlertCodeTC' in IANA Printer MIB [IANAPRT]

alert-element        = alert-index /
                       alert-severity /
                       alert-training /
                       alert-group /
                       alert-group-index /
                       alert-location /
                       alert-time

alert-index          = "index" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly mapped from
    ; 'prtAlertIndex' in [RFC1759] [RFC3805]

alert-severity       = "severity" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'critical') mapped
    ; from 'prtAlertSeverityLevel' in [RFC1759] [RFC3805] to label
    ; in 'PrtAlertSeverityLevelTC' in IANA Printer MIB [IANAPRT]

alert-training       = "training" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'fieldService') mapped
    ; from 'prtAlertTrainingLevel' in [RFC1759] [RFC3805] to label
    ; in 'PrtAlertTrainingLevelTC' in IANA Printer MIB [IANAPRT]

alert-group          = "group" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'markerSupplies')
    ; mapped from 'prtAlertGroup' in [RFC1759] [RFC3805] to label
    ; in 'PrtAlertGroupTC' in IANA Printer MIB [IANAPRT]

alert-group-index    = "groupindex" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly mapped from
    ; 'prtAlertGroupIndex' in [RFC1759] [RFC3805]

alert-location       = "location" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly mapped from
    ; 'prtAlertLocation' in [RFC1759] [RFC3805]

alert-time           = "time" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly mapped from
    ; 'prtAlertTime' in [RFC1759] [RFC3805]
```

5.2.2.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification and implement the new "printer-alert" attribute MUST implement the above standard encoding in "printer-alert" of machine-readable values of 'prtAlertTable' columnar objects [RFC3805].

5.2.2.2 Rationale for Encoding of Enumerated Values

In this specification, enumerated values of 'prtAlertTable' objects (e.g., 'prtAlertSeverityLevel') are mapped to corresponding enumeration labels in "printer-alert" for the following reasons:

○ (1) To define a strictly numeric mapping is (potentially) fragile and loses human-readability.

○ (2) To define an alphabetic (keyword) mapping is consistent with the IPP design preference for 'keyword' (section 4.1.3 of [RFC2911]) rather than 'enum' (section 4.1.4 of [RFC2911]) attribute syntaxes.

5.2.3 Example of Printer Alert

The following example shows all REQUIRED, RECOMMENDED, and OPTIONAL columnar objects from 'prtAlertTable' (see Table 3 in section 5.2.1) encoded into values of the IPP Printer "printer-alert" attribute for two distinct (but closely related) alerts. Line breaks are shown for readability of this example. Line breaks MUST NOT be encoded into actual values of "printer-alert".

```
printer-alert[1] =
  code=jam;index=22;severity=critical;training=untrained
  ;group=mediaPath;groupindex=4;location=6;time=28175
printer-alert[2] =
  code=coverOpen;index=23;severity=critical;training=untrained
  ;group=cover;groupindex=6;location=8;time=29874
```

5.3 printer-alert-description (1setOf text(MAX))

This document defines the new multi-valued IPP Printer "printer-alert-description" attribute specified as RECOMMENDED by this document [PWG5100.x].
[[Editor: replace PWG5100.x w/ number of this document]]

5.3.1 Printer Alert Description Encoding

Each text value of "printer-alert-description" MUST be mapped directly from the corresponding human-readable, localized value of 'prtAlertDescription', as follows:

○ (a) Each value of 'prtAlertDescription' MUST be converted from the charset [RFC2978] [RFC3808] specified by 'prtLocalizationCharacterSet' and 'prtGeneralCurrentLocalization' to the charset specified by "charset-configured" (defaults to UTF-8 [RFC3629]) and then copied to a text value of "printer-alert-description".

○ (b) Each value of "printer-alert-description" MUST be tagged with the natural language [RFC4646] specified by 'prtLocalizationLanguage', 'prtLocalizationCountry', and 'prtGeneralCurrentLocalization'.

○ (c) Each value of "printer-alert-description" MUST be in the same order as the corresponding value of "printer-alert".

5.3.1.1 Conformance

○ (1) For interoperability, IPP implementations that claim conformance to this specification SHOULD implement the new RECOMMENDED IPP Printer "printer-alert-description" attribute.

○ (2) For interoperability, IPP implementations that claim conformance to this specification and implement the new "printer-alert-description" attribute MUST implement the above standard encoding in "printer-alert-description" of human-readable, localized values of the 'prtAlertDescription' columnar object [RFC3805], including charset conversion and language tag copying.

5.3.2 Example of Printer Alert Description

The following example shows the one localized 'prtAlertDescription' columnar object from 'prtAlertTable' encoded into values of the IPP Printer "printer-alert-description" attribute for two distinct (but closely related) alerts.

```
printer-alert-description[1] =
   'Critical alert - jam in media path at location 6'
printer-alert-description[2] =
   'Critical alert - cover open at location 8'
```

6 IANA Printer MIB Textual Conventions

6.1 PrtAlertCodeTC

This specification defines new values of 'PrtAlertCodeTC' [IANAPRT] and corresponding new values of "printer-state-reasons" [RFC2911] for registration with IANA.

6.1.1 New Alert Codes for Finishing Subunits

The table below shows new values of "printer-state-reasons" [RFC2911] and their mapping from new values of 'PrtAlertCodeTC' [IANAPRT] and their algorithmic mapping from existing values of 'FinDeviceTypeTC' [IANAFIN].

Note: See section 6.1.1.3 'Rationale for Stapler and Stitcher Devices' and section 6.1.2 'Conventions for Alert Code Numbering' for discussion of the missing 'stapler' in IANA Finisher MIB [IANAFIN].

Table 4 - New Alert Codes for Finishing Subunits

```
PrtAlertCodeTC
        printer-state-reasons
---------------------------
-- FinDeviceTypeTC = stitcher(3) --> stapler
-- FinStitchingTypeTC = staple... (4,5,6,7, or 10)
staplerCoverOpen(30203)
        stapler-cover-open
staplerCoverClosed(30204)
        stapler-cover-closed
staplerInterlockOpen(30205)
        stapler-interlock-open
staplerInterlockClosed(30206)
        stapler-interlock-closed
staplerConfigurationChange(30207)
        stapler-configuration-change
staplerJam(30208)
        stapler-jam
staplerMissing(30209)
        stapler-missing
staplerLifeAlmostOver(30210)
        stapler-life-almost-over
staplerLifeOver(30211)
        stapler-life-over
staplerAlmostEmpty(30212)
        stapler-almost-empty
staplerEmpty(30213)
        stapler-empty
staplerAlmostFull(30214)
        stapler-almost-full
```

```
        staplerFull(30215)
                stapler-full
        staplerNearLimit(30216)
                stapler-near-limit
        staplerAtLimit(30217)
                stapler-at-limit
        staplerOpened(30218)
                stapler-opened
        staplerClosed(30219)
                stapler-closed
        staplerTurnedOn(30220)
                stapler-turned-on
        staplerTurnedOff(30221)
                stapler-turned-off
        staplerOffline(30222)
                stapler-offline
        staplerPowerSaver(30223)
                stapler-power-saver
        staplerWarmingUp(30224)
                stapler-warming-up
        staplerAdded(30225)
                stapler-added
        staplerRemoved(30226)
                stapler-removed
        staplerResourceAdded(30227)
                stapler-resource-added
        staplerResourceRemoved(30228)
                stapler-resource-removed
        staplerRecoverableFailure(30229)
                stapler-recoverable-failure
        staplerUnrecoverableFailure(30230)
                stapler-unrecoverable-failure
        staplerRecoverableStorageError(30231)
                stapler-recoverable-storage-error
        staplerUnrecoverableStorageError(30232)
                stapler-unrecoverable-storage-error
        staplerMotorFailure(30233)
                stapler-motor-failure
        staplerMemoryExhausted(30234)
                stapler-memory-exhausted
        staplerUnderTemperature(30235)
                stapler-under-temperature
        staplerOverTemperature(30236)
                stapler-over-temperature
        staplerTimingFailure(30237)
                stapler-timing-failure
        staplerThermistorFailure(30238)
                stapler-thermistor-failure

        -- FinDeviceTypeTC = stitcher(3) --> stitcher
        -- FinStitchingTypeTC = saddleStitch(8) or edgeStitch(9)
        stitcherCoverOpen(30303)
                stitcher-cover-open
        stitcherCoverClosed(30304)
                stitcher-cover-closed
        stitcherInterlockOpen(30305)
                stitcher-interlock-open
        stitcherInterlockClosed(30306)
                stitcher-interlock-closed
        stitcherConfigurationChange(30307)
                stitcher-configuration-change
        stitcherJam(30308)
                stitcher-jam
        stitcherMissing(30309)
                stitcher-missing
        stitcherLifeAlmostOver(30310)
                stitcher-life-almost-over
        stitcherLifeOver(30311)
```

```
                stitcher-life-over
stitcherAlmostEmpty(30312)
        stitcher-almost-empty
stitcherEmpty(30313)
        stitcher-empty
stitcherAlmostFull(30314)
        stitcher-almost-full
stitcherFull(30315)
        stitcher-full
stitcherNearLimit(30316)
        stitcher-near-limit
stitcherAtLimit(30317)
        stitcher-at-limit
stitcherOpened(30318)
        stitcher-opened
stitcherClosed(30319)
        stitcher-closed
stitcherTurnedOn(30320)
        stitcher-turned-on
stitcherTurnedOff(30321)
        stitcher-turned-off
stitcherOffline(30322)
        stitcher-offline
stitcherPowerSaver(30323)
        stitcher-power-saver
stitcherWarmingUp(30324)
        stitcher-warming-up
stitcherAdded(30325)
        stitcher-added
stitcherRemoved(30326)
        stitcher-removed
stitcherResourceAdded(30327)
        stitcher-resource-added
stitcherResourceRemoved(30328)
        stitcher-resource-removed
stitcherRecoverableFailure(30329)
        stitcher-recoverable-failure
stitcherUnrecoverableFailure(30330)
        stitcher-unrecoverable-failure
stitcherRecoverableStorageError(30331)
        stitcher-recoverable-storage-error
stitcherUnrecoverableStorageError(30332)
        stitcher-unrecoverable-storage-error
stitcherMotorFailure(30333)
        stitcher-motor-failure
stitcherMemoryExhausted(30334)
        stitcher-memory-exhausted
stitcherUnderTemperature(30335)
        stitcher-under-temperature
stitcherOverTemperature(30336)
        stitcher-over-temperature
stitcherTimingFailure(30337)
        stitcher-timing-failure
stitcherThermistorFailure(30338)
        stitcher-thermistor-failure

-- FinDeviceTypeTC = folder(4)
folderCoverOpen(30403)
        folder-cover-open
folderCoverClosed(30404)
        folder-cover-closed
folderInterlockOpen(30405)
        folder-interlock-open
folderInterlockClosed(30406)
        folder-interlock-closed
folderConfigurationChange(30407)
        folder-configuration-change
folderJam(30408)
```

```
                folder-jam
folderMissing(30409)
                folder-missing
folderLifeAlmostOver(30410)
                folder-life-almost-over
folderLifeOver(30411)
                folder-life-over
folderAlmostEmpty(30412)
                folder-almost-empty
folderEmpty(30413)
                folder-empty
folderAlmostFull(30414)
                folder-almost-full
folderFull(30415)
                folder-full
folderNearLimit(30416)
                folder-near-limit
folderAtLimit(30417)
                folder-at-limit
folderOpened(30418)
                folder-opened
folderClosed(30419)
                folder-closed
folderTurnedOn(30420)
                folder-turned-on
folderTurnedOff(30421)
                folder-turned-off
folderOffline(30422)
                folder-offline
folderPowerSaver(30423)
                folder-power-saver
folderWarmingUp(30424)
                folder-warming-up
folderAdded(30425)
                folder-added
folderRemoved(30426)
                folder-removed
folderResourceAdded(30427)
                folder-resource-added
folderResourceRemoved(30428)
                folder-resource-removed
folderRecoverableFailure(30429)
                folder-recoverable-failure
folderUnrecoverableFailure(30430)
                folder-unrecoverable-failure
folderRecoverableStorageError(30431)
                folder-recoverable-storage-error
folderUnrecoverableStorageError(30432)
                folder-unrecoverable-storage-error
folderMotorFailure(30433)
                folder-motor-failure
folderMemoryExhausted(30434)
                folder-memory-exhausted
folderUnderTemperature(30435)
                folder-under-temperature
folderOverTemperature(30436)
                folder-over-temperature
folderTimingFailure(30437)
                folder-timing-failure
folderThermistorFailure(30438)
                folder-thermistor-failure

-- FinDeviceTypeTC = binder(5)
binderCoverOpen(30503)
                binder-cover-open
binderCoverClosed(30504)
                binder-cover-closed
binderInterlockOpen(30505)
```

```
                binder-interlock-open
binderInterlockClosed(30506)
                binder-interlock-closed
binderConfigurationChange(30507)
                binder-configuration-change
binderJam(30508)
                binder-jam
binderMissing(30509)
                binder-missing
binderLifeAlmostOver(30510)
                binder-life-almost-over
binderLifeOver(30511)
                binder-life-over
binderAlmostEmpty(30512)
                binder-almost-empty
binderEmpty(30513)
                binder-empty
binderAlmostFull(30514)
                binder-almost-full
binderFull(30515)
                binder-full
binderNearLimit(30516)
                binder-near-limit
binderAtLimit(30517)
                binder-at-limit
binderOpened(30518)
                binder-opened
binderClosed(30519)
                binder-closed
binderTurnedOn(30520)
                binder-turned-on
binderTurnedOff(30521)
                binder-turned-off
binderOffline(30522)
                binder-offline
binderPowerSaver(30523)
                binder-power-saver
binderWarmingUp(30524)
                binder-warming-up
binderAdded(30525)
                binder-added
binderRemoved(30526)
                binder-removed
binderResourceAdded(30527)
                binder-resource-added
binderResourceRemoved(30528)
                binder-resource-removed
binderRecoverableFailure(30529)
                binder-recoverable-failure
binderUnrecoverableFailure(30530)
                binder-unrecoverable-failure
binderRecoverableStorageError(30531)
                binder-recoverable-storage-error
binderUnrecoverableStorageError(30532)
                binder-unrecoverable-storage-error
binderMotorFailure(30533)
                binder-motor-failure
binderMemoryExhausted(30534)
                binder-memory-exhausted
binderUnderTemperature(30535)
                binder-under-temperature
binderOverTemperature(30536)
                binder-over-temperature
binderTimingFailure(30537)
                binder-timing-failure
binderThermistorFailure(30538)
                binder-thermistor-failure
```

```
        -- FinDeviceTypeTC = trimmer(6)
trimmerCoverOpen(30603)
        trimmer-cover-open
trimmerCoverClosed(30604)
        trimmer-cover-closed
trimmerInterlockOpen(30605)
        trimmer-interlock-open
trimmerInterlockClosed(30606)
        trimmer-interlock-closed
trimmerConfigurationChange(30607)
        trimmer-configuration-change
trimmerJam(30608)
        trimmer-jam
trimmerMissing(30609)
        trimmer-missing
trimmerLifeAlmostOver(30610)
        trimmer-life-almost-over
trimmerLifeOver(30611)
        trimmer-life-over
trimmerAlmostEmpty(30612)
        trimmer-almost-empty
trimmerEmpty(30613)
        trimmer-empty
trimmerAlmostFull(30614)
        trimmer-almost-full
trimmerFull(30615)
        trimmer-full
trimmerNearLimit(30616)
        trimmer-near-limit
trimmerAtLimit(30617)
        trimmer-at-limit
trimmerOpened(30618)
        trimmer-opened
trimmerClosed(30619)
        trimmer-closed
trimmerTurnedOn(30620)
        trimmer-turned-on
trimmerTurnedOff(30621)
        trimmer-turned-off
trimmerOffline(30622)
        trimmer-offline
trimmerPowerSaver(30623)
        trimmer-power-saver
trimmerWarmingUp(30624)
        trimmer-warming-up
trimmerAdded(30625)
        trimmer-added
trimmerRemoved(30626)
        trimmer-removed
trimmerResourceAdded(30627)
        trimmer-resource-added
trimmerResourceRemoved(30628)
        trimmer-resource-removed
trimmerRecoverableFailure(30629)
        trimmer-recoverable-failure
trimmerUnrecoverableFailure(30630)
        trimmer-unrecoverable-failure
trimmerRecoverableStorageError(30631)
        trimmer-recoverable-storage-error
trimmerUnrecoverableStorageError(30632)
        trimmer-unrecoverable-storage-error
trimmerMotorFailure(30633)
        trimmer-motor-failure
trimmerMemoryExhausted(30634)
        trimmer-memory-exhausted
trimmerUnderTemperature(30635)
        trimmer-under-temperature
trimmerOverTemperature(30636)
```

```
                trimmer-over-temperature
        trimmerTimingFailure(30637)
                trimmer-timing-failure
        trimmerThermistorFailure(30638)
                trimmer-thermistor-failure

        -- FinDeviceTypeTC = dieCutter(7)
        dieCutterCoverOpen(30703)
                die-cutter-cover-open
        dieCutterCoverClosed(30704)
                die-cutter-cover-closed
        dieCutterInterlockOpen(30705)
                die-cutter-interlock-open
        dieCutterInterlockClosed(30706)
                die-cutter-interlock-closed
        dieCutterConfigurationChange(30707)
                die-cutter-configuration-change
        dieCutterJam(30708)
                die-cutter-jam
        dieCutterMissing(30709)
                die-cutter-missing
        dieCutterLifeAlmostOver(30710)
                die-cutter-life-almost-over
        dieCutterLifeOver(30711)
                die-cutter-life-over
        dieCutterAlmostEmpty(30712)
                die-cutter-almost-empty
        dieCutterEmpty(30713)
                die-cutter-empty
        dieCutterAlmostFull(30714)
                die-cutter-almost-full
        dieCutterFull(30715)
                die-cutter-full
        dieCutterNearLimit(30716)
                die-cutter-near-limit
        dieCutterAtLimit(30717)
                die-cutter-at-limit
        dieCutterOpened(30718)
                die-cutter-opened
        dieCutterClosed(30719)
                die-cutter-closed
        dieCutterTurnedOn(30720)
                die-cutter-turned-on
        dieCutterTurnedOff(30721)
                die-cutter-turned-off
        dieCutterOffline(30722)
                die-cutter-offline
        dieCutterPowerSaver(30723)
                die-cutter-power-saver
        dieCutterWarmingUp(30724)
                die-cutter-warming-up
        dieCutterAdded(30725)
                die-cutter-added
        dieCutterRemoved(30726)
                die-cutter-removed
        dieCutterResourceAdded(30727)
                die-cutter-resource-added
        dieCutterResourceRemoved(30728)
                die-cutter-resource-removed
        dieCutterRecoverableFailure(30729)
                die-cutter-recoverable-failure
        dieCutterUnrecoverableFailure(30730)
                die-cutter-unrecoverable-failure
        dieCutterRecoverableStorageError(30731)
                die-cutter-recoverable-storage-error
        dieCutterUnrecoverableStorageError(30732)
                die-cutter-unrecoverable-storage-error
        dieCutterMotorFailure(30733)
```

```
                die-cutter-motor-failure
dieCutterMemoryExhausted(30734)
                die-cutter-memory-exhausted
dieCutterUnderTemperature(30735)
                die-cutter-under-temperature
dieCutterOverTemperature(30736)
                die-cutter-over-temperature
dieCutterTimingFailure(30737)
                die-cutter-timing-failure
dieCutterThermistorFailure(30738)
                die-cutter-thermistor-failure


-- FinDeviceTypeTC = puncher(8)
puncherCoverOpen(30803)
                puncher-cover-open
puncherCoverClosed(30804)
                puncher-cover-closed
puncherInterlockOpen(30805)
                puncher-interlock-open
puncherInterlockClosed(30806)
                puncher-interlock-closed
puncherConfigurationChange(30807)
                puncher-configuration-change
puncherJam(30808)
                puncher-jam
puncherMissing(30809)
                puncher-missing
puncherLifeAlmostOver(30810)
                puncher-life-almost-over
puncherLifeOver(30811)
                puncher-life-over
puncherAlmostEmpty(30812)
                puncher-almost-empty
puncherEmpty(30813)
                puncher-empty
puncherAlmostFull(30814)
                puncher-almost-full
puncherFull(30815)
                puncher-full
puncherNearLimit(30816)
                puncher-near-limit
puncherAtLimit(30817)
                puncher-at-limit
puncherOpened(30818)
                puncher-opened
puncherClosed(30819)
                puncher-closed
puncherTurnedOn(30820)
                puncher-turned-on
puncherTurnedOff(30821)
                puncher-turned-off
puncherOffline(30822)
                puncher-offline
puncherPowerSaver(30823)
                puncher-power-saver
puncherWarmingUp(30824)
                puncher-warming-up
puncherAdded(30825)
                puncher-added
puncherRemoved(30826)
                puncher-removed
puncherResourceAdded(30827)
                puncher-resource-added
puncherResourceRemoved(30828)
                puncher-resource-removed
puncherRecoverableFailure(30829)
                puncher-recoverable-failure
puncherUnrecoverableFailure(30830)
```

```
                    puncher-unrecoverable-failure
        puncherRecoverableStorageError(30831)
                    puncher-recoverable-storage-error
        puncherUnrecoverableStorageError(30832)
                    puncher-unrecoverable-storage-error
        puncherMotorFailure(30833)
                    puncher-motor-failure
        puncherMemoryExhausted(30834)
                    puncher-memory-exhausted
        puncherUnderTemperature(30835)
                    puncher-under-temperature
        puncherOverTemperature(30836)
                    puncher-over-temperature
        puncherTimingFailure(30837)
                    puncher-timing-failure
        puncherThermistorFailure(30838)
                    puncher-thermistor-failure

        -- FinDeviceTypeTC = perforater(9)
        perforaterCoverOpen(30903)
                    perforater-cover-open
        perforaterCoverClosed(30904)
                    perforater-cover-closed
        perforaterInterlockOpen(30905)
                    perforater-interlock-open
        perforaterInterlockClosed(30906)
                    perforater-interlock-closed
        perforaterConfigurationChange(30907)
                    perforater-configuration-change
        perforaterJam(30908)
                    perforater-jam
        perforaterMissing(30909)
                    perforater-missing
        perforaterLifeAlmostOver(30910)
                    perforater-life-almost-over
        perforaterLifeOver(30911)
                    perforater-life-over
        perforaterAlmostEmpty(30912)
                    perforater-almost-empty
        perforaterEmpty(30913)
                    perforater-empty
        perforaterAlmostFull(30914)
                    perforater-almost-full
        perforaterFull(30915)
                    perforater-full
        perforaterNearLimit(30916)
                    perforater-near-limit
        perforaterAtLimit(30917)
                    perforater-at-limit
        perforaterOpened(30918)
                    perforater-opened
        perforaterClosed(30919)
                    perforater-closed
        perforaterTurnedOn(30920)
                    perforater-turned-on
        perforaterTurnedOff(30921)
                    perforater-turned-off
        perforaterOffline(30922)
                    perforater-offline
        perforaterPowerSaver(30923)
                    perforater-power-saver
        perforaterWarmingUp(30924)
                    perforater-warming-up
        perforaterAdded(30925)
                    perforater-added
        perforaterRemoved(30926)
                    perforater-removed
        perforaterResourceAdded(30927)
```

```
                perforater-resource-added
        perforaterResourceRemoved(30928)
                perforater-resource-removed
        perforaterRecoverableFailure(30929)
                perforater-recoverable-failure
        perforaterUnrecoverableFailure(30930)
                perforater-unrecoverable-failure
        perforaterRecoverableStorageError(30931)
                perforater-recoverable-storage-error
        perforaterUnrecoverableStorageError(30932)
                perforater-unrecoverable-storage-error
        perforaterMotorFailure(30933)
                perforater-motor-failure
        perforaterMemoryExhausted(30934)
                perforater-memory-exhausted
        perforaterUnderTemperature(30935)
                perforater-under-temperature
        perforaterOverTemperature(30936)
                perforater-over-temperature
        perforaterTimingFailure(30937)
                perforater-timing-failure
        perforaterThermistorFailure(30938)
                perforater-thermistor-failure

        -- FinDeviceTypeTC = slitter(10)
        slitterCoverOpen(31003)
                slitter-cover-open
        slitterCoverClosed(31004)
                slitter-cover-closed
        slitterInterlockOpen(31005)
                slitter-interlock-open
        slitterInterlockClosed(31006)
                slitter-interlock-closed
        slitterConfigurationChange(31007)
                slitter-configuration-change
        slitterJam(31008)
                slitter-jam
        slitterMissing(31009)
                slitter-missing
        slitterLifeAlmostOver(31010)
                slitter-life-almost-over
        slitterLifeOver(31011)
                slitter-life-over
        slitterAlmostEmpty(31012)
                slitter-almost-empty
        slitterEmpty(31013)
                slitter-empty
        slitterAlmostFull(31014)
                slitter-almost-full
        slitterFull(31015)
                slitter-full
        slitterNearLimit(31016)
                slitter-near-limit
        slitterAtLimit(31017)
                slitter-at-limit
        slitterOpened(31018)
                slitter-opened
        slitterClosed(31019)
                slitter-closed
        slitterTurnedOn(31020)
                slitter-turned-on
        slitterTurnedOff(31021)
                slitter-turned-off
        slitterOffline(31022)
                slitter-offline
        slitterPowerSaver(31023)
                slitter-power-saver
        slitterWarmingUp(31024)
```

```
                slitter-warming-up
        slitterAdded(31025)
                slitter-added
        slitterRemoved(31026)
                slitter-removed
        slitterResourceAdded(31027)
                slitter-resource-added
        slitterResourceRemoved(31028)
                slitter-resource-removed
        slitterRecoverableFailure(31029)
                slitter-recoverable-failure
        slitterUnrecoverableFailure(31030)
                slitter-unrecoverable-failure
        slitterRecoverableStorageError(31031)
                slitter-recoverable-storage-error
        slitterUnrecoverableStorageError(31032)
                slitter-unrecoverable-storage-error
        slitterMotorFailure(31033)
                slitter-motor-failure
        slitterMemoryExhausted(31034)
                slitter-memory-exhausted
        slitterUnderTemperature(31035)
                slitter-under-temperature
        slitterOverTemperature(31036)
                slitter-over-temperature
        slitterTimingFailure(31037)
                slitter-timing-failure
        slitterThermistorFailure(31038)
                slitter-thermistor-failure

        -- FinDeviceTypeTC = separationCutter(11)
        separationCutterCoverOpen(31103)
                separation-cutter-cover-open
        separationCutterCoverClosed(31104)
                separation-cutter-cover-closed
        separationCutterInterlockOpen(31105)
                separation-cutter-interlock-open
        separationCutterInterlockClosed(31106)
                separation-cutter-interlock-closed
        separationCutterConfigurationChange(31107)
                separation-cutter-configuration-change
        separationCutterJam(31108)
                separation-cutter-jam
        separationCutterMissing(31109)
                separation-cutter-missing
        separationCutterLifeAlmostOver(31110)
                separation-cutter-life-almost-over
        separationCutterLifeOver(31111)
                separation-cutter-life-over
        separationCutterAlmostEmpty(31112)
                separation-cutter-almost-empty
        separationCutterEmpty(31113)
                separation-cutter-empty
        separationCutterAlmostFull(31114)
                separation-cutter-almost-full
        separationCutterFull(31115)
                separation-cutter-full
        separationCutterNearLimit(31116)
                separation-cutter-near-limit
        separationCutterAtLimit(31117)
                separation-cutter-at-limit
        separationCutterOpened(31118)
                separation-cutter-opened
        separationCutterClosed(31119)
                separation-cutter-closed
        separationCutterTurnedOn(31120)
                separation-cutter-turned-on
        separationCutterTurnedOff(31121)
```

```
        separation-cutter-turned-off
separationCutterOffline(31122)
        separation-cutter-offline
separationCutterPowerSaver(31123)
        separation-cutter-power-saver
separationCutterWarmingUp(31124)
        separation-cutter-warming-up
separationCutterAdded(31125)
        separation-cutter-added
separationCutterRemoved(31126)
        separation-cutter-removed
separationCutterResourceAdded(31127)
        separation-cutter-resource-added
separationCutterResourceRemoved(31128)
        separation-cutter-resource-removed
separationCutterRecoverableFailure(31129)
        separation-cutter-recoverable-failure
separationCutterUnrecoverableFailure(31130)
        separation-cutter-unrecoverable-failure
separationCutterRecoverableStorageError(31131)
        separation-cutter-recoverable-storage-error
separationCutterUnrecoverableStorageError(31132)
        separation-cutter-unrecoverable-storage-error
separationCutterMotorFailure(31133)
        separation-cutter-motor-failure
separationCutterMemoryExhausted(31134)
        separation-cutter-memory-exhausted
separationCutterUnderTemperature(31135)
        separation-cutter-under-temperature
separationCutterOverTemperature(31136)
        separation-cutter-over-temperature
separationCutterTimingFailure(31137)
        separation-cutter-timing-failure
separationCutterThermistorFailure(31138)
        separation-cutter-thermistor-failure

-- FinDeviceTypeTC = imprinter(12)
imprinterCoverOpen(31203)
        imprinter-cover-open
imprinterCoverClosed(31204)
        imprinter-cover-closed
imprinterInterlockOpen(31205)
        imprinter-interlock-open
imprinterInterlockClosed(31206)
        imprinter-interlock-closed
imprinterConfigurationChange(31207)
        imprinter-configuration-change
imprinterJam(31208)
        imprinter-jam
imprinterMissing(31209)
        imprinter-missing
imprinterLifeAlmostOver(31210)
        imprinter-life-almost-over
imprinterLifeOver(31211)
        imprinter-life-over
imprinterAlmostEmpty(31212)
        imprinter-almost-empty
imprinterEmpty(31213)
        imprinter-empty
imprinterAlmostFull(31214)
        imprinter-almost-full
imprinterFull(31215)
        imprinter-full
imprinterNearLimit(31216)
        imprinter-near-limit
imprinterAtLimit(31217)
        imprinter-at-limit
imprinterOpened(31218)
```

```
                imprinter-opened
imprinterClosed(31219)
        imprinter-closed
imprinterTurnedOn(31220)
        imprinter-turned-on
imprinterTurnedOff(31221)
        imprinter-turned-off
imprinterOffline(31222)
        imprinter-offline
imprinterPowerSaver(31223)
        imprinter-power-saver
imprinterWarmingUp(31224)
        imprinter-warming-up
imprinterAdded(31225)
        imprinter-added
imprinterRemoved(31226)
        imprinter-removed
imprinterResourceAdded(31227)
        imprinter-resource-added
imprinterResourceRemoved(31228)
        imprinter-resource-removed
imprinterRecoverableFailure(31229)
        imprinter-recoverable-failure
imprinterUnrecoverableFailure(31230)
        imprinter-unrecoverable-failure
imprinterRecoverableStorageError(31231)
        imprinter-recoverable-storage-error
imprinterUnrecoverableStorageError(31232)
        imprinter-unrecoverable-storage-error
imprinterMotorFailure(31233)
        imprinter-motor-failure
imprinterMemoryExhausted(31234)
        imprinter-memory-exhausted
imprinterUnderTemperature(31235)
        imprinter-under-temperature
imprinterOverTemperature(31236)
        imprinter-over-temperature
imprinterTimingFailure(31237)
        imprinter-timing-failure
imprinterThermistorFailure(31238)
        imprinter-thermistor-failure

-- FinDeviceTypeTC = wrapper(13)
wrapperCoverOpen(31303)
        wrapper-cover-open
wrapperCoverClosed(31304)
        wrapper-cover-closed
wrapperInterlockOpen(31305)
        wrapper-interlock-open
wrapperInterlockClosed(31306)
        wrapper-interlock-closed
wrapperConfigurationChange(31307)
        wrapper-configuration-change
wrapperJam(31308)
        wrapper-jam
wrapperMissing(31309)
        wrapper-missing
wrapperLifeAlmostOver(31310)
        wrapper-life-almost-over
wrapperLifeOver(31311)
        wrapper-life-over
wrapperAlmostEmpty(31312)
        wrapper-almost-empty
wrapperEmpty(31313)
        wrapper-empty
wrapperAlmostFull(31314)
        wrapper-almost-full
wrapperFull(31315)
```

```
                wrapper-full
wrapperNearLimit(31316)
        wrapper-near-limit
wrapperAtLimit(31317)
        wrapper-at-limit
wrapperOpened(31318)
        wrapper-opened
wrapperClosed(31319)
        wrapper-closed
wrapperTurnedOn(31320)
        wrapper-turned-on
wrapperTurnedOff(31321)
        wrapper-turned-off
wrapperOffline(31322)
        wrapper-offline
wrapperPowerSaver(31323)
        wrapper-power-saver
wrapperWarmingUp(31324)
        wrapper-warming-up
wrapperAdded(31325)
        wrapper-added
wrapperRemoved(31326)
        wrapper-removed
wrapperResourceAdded(31327)
        wrapper-resource-added
wrapperResourceRemoved(31328)
        wrapper-resource-removed
wrapperRecoverableFailure(31329)
        wrapper-recoverable-failure
wrapperUnrecoverableFailure(31330)
        wrapper-unrecoverable-failure
wrapperRecoverableStorageError(31331)
        wrapper-recoverable-storage-error
wrapperUnrecoverableStorageError(31332)
        wrapper-unrecoverable-storage-error
wrapperMotorFailure(31333)
        wrapper-motor-failure
wrapperMemoryExhausted(31334)
        wrapper-memory-exhausted
wrapperUnderTemperature(31335)
        wrapper-under-temperature
wrapperOverTemperature(31336)
        wrapper-over-temperature
wrapperTimingFailure(31337)
        wrapper-timing-failure
wrapperThermistorFailure(31338)
        wrapper-thermistor-failure

-- FinDeviceTypeTC = bander(14)
banderCoverOpen(31403)
        bander-cover-open
banderCoverClosed(31404)
        bander-cover-closed
banderInterlockOpen(31405)
        bander-interlock-open
banderInterlockClosed(31406)
        bander-interlock-closed
banderConfigurationChange(31407)
        bander-configuration-change
banderJam(31408)
        bander-jam
banderMissing(31409)
        bander-missing
banderLifeAlmostOver(31410)
        bander-life-almost-over
banderLifeOver(31411)
        bander-life-over
banderAlmostEmpty(31412)
```

```
                bander-almost-empty
banderEmpty(31413)
        bander-empty
banderAlmostFull(31414)
        bander-almost-full
banderFull(31415)
        bander-full
banderNearLimit(31416)
        bander-near-limit
banderAtLimit(31417)
        bander-at-limit
banderOpened(31418)
        bander-opened
banderClosed(31419)
        bander-closed
banderTurnedOn(31420)
        bander-turned-on
banderTurnedOff(31421)
        bander-turned-off
banderOffline(31422)
        bander-offline
banderPowerSaver(31423)
        bander-power-saver
banderWarmingUp(31424)
        bander-warming-up
banderAdded(31425)
        bander-added
banderRemoved(31426)
        bander-removed
banderResourceAdded(31427)
        bander-resource-added
banderResourceRemoved(31428)
        bander-resource-removed
banderRecoverableFailure(31429)
        bander-recoverable-failure
banderUnrecoverableFailure(31430)
        bander-unrecoverable-failure
banderRecoverableStorageError(31431)
        bander-recoverable-storage-error
banderUnrecoverableStorageError(31432)
        bander-unrecoverable-storage-error
banderMotorFailure(31433)
        bander-motor-failure
banderMemoryExhausted(31434)
        bander-memory-exhausted
banderUnderTemperature(31435)
        bander-under-temperature
banderOverTemperature(31436)
        bander-over-temperature
banderTimingFailure(31437)
        bander-timing-failure
banderThermistorFailure(31438)
        bander-thermistor-failure

-- FinDeviceTypeTC = makeEnvelope(15)
makeEnvelopeCoverOpen(31503)
        make-envelope-cover-open
makeEnvelopeCoverClosed(31504)
        make-envelope-cover-closed
makeEnvelopeInterlockOpen(31505)
        make-envelope-interlock-open
makeEnvelopeInterlockClosed(31506)
        make-envelope-interlock-closed
makeEnvelopeConfigurationChange(31507)
        make-envelope-configuration-change
makeEnvelopeJam(31508)
        make-envelope-jam
makeEnvelopeMissing(31509)
```

```
        make-envelope-missing
makeEnvelopeLifeAlmostOver(31510)
        make-envelope-life-almost-over
makeEnvelopeLifeOver(31511)
        make-envelope-life-over
makeEnvelopeAlmostEmpty(31512)
        make-envelope-almost-empty
makeEnvelopeEmpty(31513)
        make-envelope-empty
makeEnvelopeAlmostFull(31514)
        make-envelope-almost-full
makeEnvelopeFull(31515)
        make-envelope-full
makeEnvelopeNearLimit(31516)
        make-envelope-near-limit
makeEnvelopeAtLimit(31517)
        make-envelope-at-limit
makeEnvelopeOpened(31518)
        make-envelope-opened
makeEnvelopeClosed(31519)
        make-envelope-closed
makeEnvelopeTurnedOn(31520)
        make-envelope-turned-on
makeEnvelopeTurnedOff(31521)
        make-envelope-turned-off
makeEnvelopeOffline(31522)
        make-envelope-offline
makeEnvelopePowerSaver(31523)
        make-envelope-power-saver
makeEnvelopeWarmingUp(31524)
        make-envelope-warming-up
makeEnvelopeAdded(31525)
        make-envelope-added
makeEnvelopeRemoved(31526)
        make-envelope-removed
makeEnvelopeResourceAdded(31527)
        make-envelope-resource-added
makeEnvelopeResourceRemoved(31528)
        make-envelope-resource-removed
makeEnvelopeRecoverableFailure(31529)
        make-envelope-recoverable-failure
makeEnvelopeUnrecoverableFailure(31530)
        make-envelope-unrecoverable-failure
makeEnvelopeRecoverableStorageError(31531)
        make-envelope-recoverable-storage-error
makeEnvelopeUnrecoverableStorageError(31532)
        make-envelope-unrecoverable-storage-error
makeEnvelopeMotorFailure(31533)
        make-envelope-motor-failure
makeEnvelopeMemoryExhausted(31534)
        make-envelope-memory-exhausted
makeEnvelopeUnderTemperature(31535)
        make-envelope-under-temperature
makeEnvelopeOverTemperature(31536)
        make-envelope-over-temperature
makeEnvelopeTimingFailure(31537)
        make-envelope-timing-failure
makeEnvelopeThermistorFailure(31538)
        make-envelope-thermistor-failure

-- FinDeviceTypeTC = stacker(16)
stackerCoverOpen(31603)
        stacker-cover-open
stackerCoverClosed(31604)
        stacker-cover-closed
stackerInterlockOpen(31605)
        stacker-interlock-open
stackerInterlockClosed(31606)
```

```
                stacker-interlock-closed
stackerConfigurationChange(31607)
                stacker-configuration-change
stackerJam(31608)
                stacker-jam
stackerMissing(31609)
                stacker-missing
stackerLifeAlmostOver(31610)
                stacker-life-almost-over
stackerLifeOver(31611)
                stacker-life-over
stackerAlmostEmpty(31612)
                stacker-almost-empty
stackerEmpty(31613)
                stacker-empty
stackerAlmostFull(31614)
                stacker-almost-full
stackerFull(31615)
                stacker-full
stackerNearLimit(31616)
                stacker-near-limit
stackerAtLimit(31617)
                stacker-at-limit
stackerOpened(31618)
                stacker-opened
stackerClosed(31619)
                stacker-closed
stackerTurnedOn(31620)
                stacker-turned-on
stackerTurnedOff(31621)
                stacker-turned-off
stackerOffline(31622)
                stacker-offline
stackerPowerSaver(31623)
                stacker-power-saver
stackerWarmingUp(31624)
                stacker-warming-up
stackerAdded(31625)
                stacker-added
stackerRemoved(31626)
                stacker-removed
stackerResourceAdded(31627)
                stacker-resource-added
stackerResourceRemoved(31628)
                stacker-resource-removed
stackerRecoverableFailure(31629)
                stacker-recoverable-failure
stackerUnrecoverableFailure(31630)
                stacker-unrecoverable-failure
stackerRecoverableStorageError(31631)
                stacker-recoverable-storage-error
stackerUnrecoverableStorageError(31632)
                stacker-unrecoverable-storage-error
stackerMotorFailure(31633)
                stacker-motor-failure
stackerMemoryExhausted(31634)
                stacker-memory-exhausted
stackerUnderTemperature(31635)
                stacker-under-temperature
stackerOverTemperature(31636)
                stacker-over-temperature
stackerTimingFailure(31637)
                stacker-timing-failure
stackerThermistorFailure(31638)
                stacker-thermistor-failure

-- FinDeviceTypeTC = sheetRotator(17)
sheetRotatorCoverOpen(31703)
```

```
        sheet-rotator-cover-open
sheetRotatorCoverClosed(31704)
        sheet-rotator-cover-closed
sheetRotatorInterlockOpen(31705)
        sheet-rotator-interlock-open
sheetRotatorInterlockClosed(31706)
        sheet-rotator-interlock-closed
sheetRotatorConfigurationChange(31707)
        sheet-rotator-configuration-change
sheetRotatorJam(31708)
        sheet-rotator-jam
sheetRotatorMissing(31709)
        sheet-rotator-missing
sheetRotatorLifeAlmostOver(31710)
        sheet-rotator-life-almost-over
sheetRotatorLifeOver(31711)
        sheet-rotator-life-over
sheetRotatorAlmostEmpty(31712)
        sheet-rotator-almost-empty
sheetRotatorEmpty(31713)
        sheet-rotator-empty
sheetRotatorAlmostFull(31714)
        sheet-rotator-almost-full
sheetRotatorFull(31715)
        sheet-rotator-full
sheetRotatorNearLimit(31716)
        sheet-rotator-near-limit
sheetRotatorAtLimit(31717)
        sheet-rotator-at-limit
sheetRotatorOpened(31718)
        sheet-rotator-opened
sheetRotatorClosed(31719)
        sheet-rotator-closed
sheetRotatorTurnedOn(31720)
        sheet-rotator-turned-on
sheetRotatorTurnedOff(31721)
        sheet-rotator-turned-off
sheetRotatorOffline(31722)
        sheet-rotator-offline
sheetRotatorPowerSaver(31723)
        sheet-rotator-power-saver
sheetRotatorWarmingUp(31724)
        sheet-rotator-warming-up
sheetRotatorAdded(31725)
        sheet-rotator-added
sheetRotatorRemoved(31726)
        sheet-rotator-removed
sheetRotatorResourceAdded(31727)
        sheet-rotator-resource-added
sheetRotatorResourceRemoved(31728)
        sheet-rotator-resource-removed
sheetRotatorRecoverableFailure(31729)
        sheet-rotator-recoverable-failure
sheetRotatorUnrecoverableFailure(31730)
        sheet-rotator-unrecoverable-failure
sheetRotatorRecoverableStorageError(31731)
        sheet-rotator-recoverable-storage-error
sheetRotatorUnrecoverableStorageError(31732)
        sheet-rotator-unrecoverable-storage-error
sheetRotatorMotorFailure(31733)
        sheet-rotator-motor-failure
sheetRotatorMemoryExhausted(31734)
        sheet-rotator-memory-exhausted
sheetRotatorUnderTemperature(31735)
        sheet-rotator-under-temperature
sheetRotatorOverTemperature(31736)
        sheet-rotator-over-temperature
sheetRotatorTimingFailure(31737)
```

```
                sheet-rotator-timing-failure
        sheetRotatorThermistorFailure(31738)
                sheet-rotator-thermistor-failure

        -- FinDeviceTypeTC = inserter(18)
        inserterCoverOpen(31803)
                inserter-cover-open
        inserterCoverClosed(31804)
                inserter-cover-closed
        inserterInterlockOpen(31805)
                inserter-interlock-open
        inserterInterlockClosed(31806)
                inserter-interlock-closed
        inserterConfigurationChange(31807)
                inserter-configuration-change
        inserterJam(31808)
                inserter-jam
        inserterMissing(31809)
                inserter-missing
        inserterLifeAlmostOver(31810)
                inserter-life-almost-over
        inserterLifeOver(31811)
                inserter-life-over
        inserterAlmostEmpty(31812)
                inserter-almost-empty
        inserterEmpty(31813)
                inserter-empty
        inserterAlmostFull(31814)
                inserter-almost-full
        inserterFull(31815)
                inserter-full
        inserterNearLimit(31816)
                inserter-near-limit
        inserterAtLimit(31817)
                inserter-at-limit
        inserterOpened(31818)
                inserter-opened
        inserterClosed(31819)
                inserter-closed
        inserterTurnedOn(31820)
                inserter-turned-on
        inserterTurnedOff(31821)
                inserter-turned-off
        inserterOffline(31822)
                inserter-offline
        inserterPowerSaver(31823)
                inserter-power-saver
        inserterWarmingUp(31824)
                inserter-warming-up
        inserterAdded(31825)
                inserter-added
        inserterRemoved(31826)
                inserter-removed
        inserterResourceAdded(31827)
                inserter-resource-added
        inserterResourceRemoved(31828)
                inserter-resource-removed
        inserterRecoverableFailure(31829)
                inserter-recoverable-failure
        inserterUnrecoverableFailure(31830)
                inserter-unrecoverable-failure
        inserterRecoverableStorageError(31831)
                inserter-recoverable-storage-error
        inserterUnrecoverableStorageError(31832)
                inserter-unrecoverable-storage-error
        inserterMotorFailure(31833)
                inserter-motor-failure
        inserterMemoryExhausted(31834)
```

```
        inserter-memory-exhausted
inserterUnderTemperature(31835)
        inserter-under-temperature
inserterOverTemperature(31836)
        inserter-over-temperature
inserterTimingFailure(31837)
        inserter-timing-failure
inserterThermistorFailure(31838)
        inserter-thermistor-failure
```

6.1.1.1 Conformance

- (1) For interoperability, IPP implementations that claim conformance to this specification MUST implement the Table 4 standard mappings between existing values of 'FinDeviceTypeTC' [IANAFIN] and new values of 'PrtAlertCodeTC' [IANAPRT] and new values of "printer-state-reasons" [RFC2911].

- (2) For interoperability, IPP implementations that claim conformance to this specification MUST implement the Table 4 standard mappings between existing values of 'FinStitchingTypeTC' [IANAFIN] and new values of 'PrtAlertCodeTC' [IANAPRT] and new values of "printer-state-reasons" [RFC2911].

6.1.1.2 Rationale for New Finishing Alert Codes

In this specification, existing enumerated values of 'FinDeviceTypeTC' [IANAFIN] (e.g., 'binder(5)') are mapped algorithmically to new enumerated values of 'PrtAlertCodeTC' [IANAPRT] (e.g., 'binderJam(30508)') for the following reasons:

- (1) Unlike the base tables in IETF Printer MIB [RFC3805] (e.g., 'prtInputTable') which are mapped meaningfully to values of 'PrtAlertCodeTC' (e.g., 'inputMediaSizeChange(802)'), the base table in IETF Finisher MIB [RFC3805] ('finDeviceTable') is not currently mapped to meaningful specific alerts.

- (2) 'finDeviceTable' [RFC3806] entries are only distinguished by a non-index columnar object ('finDeviceType') which is NOT included in 'prtAlertTable' (and therefore NOT mapped to "printer-alert").

- (3) Finishing alerts reported using the generic subunit alerts (e.g., 'subunitAlmostFull') are meaningless without a subsequent query of 'finDeviceTable' (impossible if SNMP is disabled).

6.1.1.3 Rationale for Stapler and Stitcher Devices

In this specification the one value 'stitcher(3)' of 'FinDeviceTypeTC' [IANAFIN] is mapped algorithmically to _two_ new sets of enumerated values of 'PrtAlertCodeTC' [IANAPRT] (e.g., 'staplerJam(30208)' and 'stitcherJam(30308)'), based on values of 'FinStitchingTypeTC' (e.g., 'stapleTopLeft(4)' and 'saddleStitch(8)') in the 'stitchingType(30)' attribute in 'finDeviceAttributeTable', for the following reasons:

- (1) Both 'staple' and 'stitch' finishing processes are defined in section 2.2 'Process Specific Terminology' of IETF Finisher MIB [RFC3806].

- (2) But, unlike _all_ other finishing processes in IETF Finisher MIB [RFC3806], the 'stapler' and 'stitcher' were merged into a single 'stitcher(3)' value of 'FinDeviceTypeTC' in IANA Finisher

MIB [IANAFIN] for the 'finDeviceType' non-index object in 'finDeviceTable' [RFC3806].

- ○ (3) The 'stapler' versus 'stitcher' finishing device types are only disambiguated via values of 'FinStitchingTypeTC' in IANA Finisher MIB [IANAFIN] for the 'stitchingType(30)' attribute in 'finDeviceAttributeTable' in the IETF Finisher MIB [RFC3806].

6.1.2 Conventions for Alert Code Numbering

Printer MIB v1/v2 [RFC1759] [RFC3805] follows a convention that values of 'PrtAlertCodeTC' (e.g., 'inputMediaTrayMissing(801)') are defined in ranges found by multiplying the corresponding value of 'PrtAlertGroupTC' (e.g., 'input(8)') by 100 and skipping the even hundred (e.g., '800'). For example, 'input(8)' maps to a range of '801' to '899'.

But specific alert codes for Finishing Subunits also need the context of the value of 'FinDeviceTypeTC' [IANAFIN] in the 'finDeviceType' non-index object in the 'finDeviceTable' [RFC3806], because this object is NOT encoded in 'prtAlertTable' [RFC3805].

Therefore, this specification defines a new convention that specific alert code values for Finishing Subunits (e.g., 'slitterJam(31001)') MUST be mapped from existing values of 'FinDeviceTypeTC' [IANAFIN] (e.g., 'slitter(10')' in ranges of '3nn01' to '3nn99', to avoid colliding with new alert groups that may be added to 'PrtAlertGroupTC' in the future.

This specification also defines a new convention specific alert code values for 'stapler' and 'stitcher' finishing device types are defined in two parallel ranges. See section 6.1.1.3 'Rationale for Stapler and 'Stitcher Devices' for more details.

7 Conformance Requirements

7.1 IPP Printer Conformance Requirements

An IPP Printer that claims conformance to this specification MUST implement all of the requirements and SHOULD implement all of the recommendations specified in sections 5.1.1.1, 5.1.2.1, 5.1.3.1, 5.1.4.1, 5.2.1.1, 5.2.2.1, 5.3.1.1, and 6.1.1.1.

7.2 IPP Client Conformance Requirements

An IPP Client that claims conformance to this specification MUST implement all of the requirements and SHOULD implement all of the recommendations specified in sections 5.1.1.1, 5.1.2.1, 5.1.3.1, 5.1.4.1, 5.2.1.1, 5.2.2.1, 5.3.1.1, and 6.1.1.1.

7.3 Printer MIB Agent Conformance Requirements

A Printer MIB Agent that claims conformance to this specification MUST implement all of the requirements and SHOULD implement all of the recommendations specified in section 6.1.1.1.

7.4 Printer MIB Client Conformance Requirements

A Printer MIB Client that claims conformance to this specification MUST implement all of the

requirements and SHOULD implement all of the recommendations specified in section 6.1.1.1.

8 IANA Considerations

8.1 IPP Keyword Attribute Values - IANA Registrations

This section contains the updates for IANA to add to the IANA IPP Registry [IANAIPP] according to the procedures defined in section 6 of [RFC2911] for the additional keyword attribute values for the IPP Printer "printer-state-reasons" attribute defined in this document. The resulting registrations will be published in:

http://www.iana.org/assignments/ipp-registrations

```
Attribute Name (attribute syntax)              Reference    Section
--------------------------------               ---------    -------
Printer Description attributes:

printer-state-reasons (1setOf type2 keyword)   [RFC2911]    4.4.12
  unknown                                      [PWG5100.x]  5.1.3
  cover-closed                                 [PWG5100.x]  5.1.3
  interlock-closed                             [PWG5100.x]  5.1.3
  configuration-change                         [PWG5100.x]  5.1.3
  subunit-missing                              [PWG5100.x]  5.1.3
  subunit-life-almost-over                     [PWG5100.x]  5.1.3
  subunit-life-over                            [PWG5100.x]  5.1.3
  subunit-almost-empty                         [PWG5100.x]  5.1.3
  subunit-empty                                [PWG5100.x]  5.1.3
  subunit-almost-full                          [PWG5100.x]  5.1.3
  subunit-full                                 [PWG5100.x]  5.1.3
  subunit-near-limit                           [PWG5100.x]  5.1.3
  subunit-at-limit                             [PWG5100.x]  5.1.3
  subunit-opened                               [PWG5100.x]  5.1.3
  subunit-closed                               [PWG5100.x]  5.1.3
  subunit-turned-on                            [PWG5100.x]  5.1.3
  subunit-turned-off                           [PWG5100.x]  5.1.3
  subunit-offline                              [PWG5100.x]  5.1.3
  subunit-power-saver                          [PWG5100.x]  5.1.3
  subunit-warming-up                           [PWG5100.x]  5.1.3
  subunit-added                                [PWG5100.x]  5.1.3
  subunit-removed                              [PWG5100.x]  5.1.3
  subunit-resource-added                       [PWG5100.x]  5.1.3
  subunit-resource-removed                     [PWG5100.x]  5.1.3
  subunit-recoverable-failure                  [PWG5100.x]  5.1.3
  subunit-unrecoverable-failure                [PWG5100.x]  5.1.3
  subunit-recoverable-storage-error            [PWG5100.x]  5.1.3
  subunit-unrecoverable-storage-error          [PWG5100.x]  5.1.3
  subunit-motor-failure                        [PWG5100.x]  5.1.3
  subunit-memory-exhausted                     [PWG5100.x]  5.1.3
  subunit-under-temperature                    [PWG5100.x]  5.1.3
  subunit-over-temperature                     [PWG5100.x]  5.1.3
  subunit-timing-Failure                       [PWG5100.x]  5.1.3
  subunit-thermistor-failure                   [PWG5100.x]  5.1.3
  power-up                                     [PWG5100.x]  5.1.3
  power-down                                   [PWG5100.x]  5.1.3
  printer-nms-reset                            [PWG5100.x]  5.1.3
  printer-manual-reset                         [PWG5100.x]  5.1.3
  printer-ready-to-print                       [PWG5100.x]  5.1.3
  input-media-size-change                      [PWG5100.x]  5.1.3
  input-media-weight-change                    [PWG5100.x]  5.1.3
  input-media-type-change                      [PWG5100.x]  5.1.3
  input-media-color-change                     [PWG5100.x]  5.1.3
  input-media-form-parts-change                [PWG5100.x]  5.1.3
```

```
     input-manual-input-request                           [PWG5100.x]   5.1.3
     input-tray-position-failure                          [PWG5100.x]   5.1.3
     input-tray-elevation-failure                         [PWG5100.x]   5.1.3
     input-cannot-feed-size-selected                      [PWG5100.x]   5.1.3
     output-mailbox-select-failure                        [PWG5100.x]   5.1.3
     marker-fuser-timing-failure                          [PWG5100.x]   5.1.3
     marker-fuser-thermistor-failure                      [PWG5100.x]   5.1.3
     marker-adjusting-print-quality                       [PWG5100.x]   5.1.3
     marker-ink-empty                                     [PWG5100.x]   5.1.3
     marker-print-ribbon-empty                            [PWG5100.x]   5.1.3
     marker-ink-almost-empty                              [PWG5100.x]   5.1.3
     marker-print-ribbon-almost-empty                     [PWG5100.x]   5.1.3
     marker-waste-toner-receptacle-almost-full            [PWG5100.x]   5.1.3
     marker-waste-ink-receptacle-almost-full              [PWG5100.x]   5.1.3
     marker-waste-toner-receptacle-full                   [PWG5100.x]   5.1.3
     marker-waste-ink-receptacle-full                     [PWG5100.x]   5.1.3
     marker-developer-almost-empty                        [PWG5100.x]   5.1.3
     marker-developer-empty                               [PWG5100.x]   5.1.3
     marker-toner-cartridge-missing                       [PWG5100.x]   5.1.3
     media-path-media-tray-missing                        [PWG5100.x]   5.1.3
     media-path-media-tray-almost-full                    [PWG5100.x]   5.1.3
     media-path-media-tray-full                           [PWG5100.x]   5.1.3
     media-path-cannot-duplex-media-selected              [PWG5100.x]   5.1.3
     interpreter-memory-increase                          [PWG5100.x]   5.1.3
     interpreter-memory-decrease                          [PWG5100.x]   5.1.3
     interpreter-cartridge-added                          [PWG5100.x]   5.1.3
     interpreter-cartridge-deleted                        [PWG5100.x]   5.1.3
     interpreter-resource-added                           [PWG5100.x]   5.1.3
     interpreter-resource-deleted                         [PWG5100.x]   5.1.3
     interpreter-complex-page-encountered                 [PWG5100.x]   5.1.3
     alert-removal-of-binary-change-entry                 [PWG5100.x]   5.1.3

     stapler-cover-open                                   [PWG5100.x]   6.1.1
       [...]
     inserter-thermistor-failure                          [PWG5100.x]   6.1.1
```

[[Editor: cut-and-paste lists from earlier definition sections]]

[[Editor: replace PWG5100.x w/ number of this document]]

8.2 IPP Printer Attributes - IANA Registrations

This section contains the updates for IANA to add to the IANA IPP Registry [IANAIPP] according to the procedures defined in section 6 of [RFC2911] for the IPP Printer attributes defined in this document. The resulting registrations will be published in:

http://www.iana.org/assignments/ipp-registrations

```
Attribute Name (attribute syntax)                 Reference     Section
---------------------------------                 ---------     -------
Printer Description attributes:

printer-alert (1setOf octetString(MAX))           [PWG5100.x]   5.2
printer-alert-description (1setOf text(MAX))       [PWG5100.x]   5.3
```

[[Editor: replace PWG5100.x w/ number of this document]]

8.3 IANA Printer MIB - IANA Registrations

This section contains the updates for IANA to add to the IANA Printer MIB according to the procedures defined in section 7 of [RFC3805] for the additional enumerated values for the

'PrtAlertCodeTC' textual convention defined in this document. The resulting registrations will be published in:

http://www.iana.org/assignments/ianaprinter-mib

IANA should first remove the comma on the last enumerated value in the 'PrtAlertCodeTC' textual convention and then insert the following new enumerated values:

```
staplerCoverOpen(30203),                                 -- PWG5100.x
[...]
inserterThermistorFailure(31838)                         -- PWG5100.x
```

[[Editor: cut-and-paste list from earlier definition section]]

[[Editor: replace PWG5100.x w/ number of this document]]

9 Internationalization Considerations

In section 5, this document defines the new human-readable, localized "printer-alert-description" IPP Printer attribute using the existing 'text' syntax defined in section 4.1.1 of [RFC2911]. Values of this new attribute MUST copy their natural language tag [RFC4646] from the values of 'prtLocalizationLanguage', 'prtLocalizationCountry', and 'prtGeneralCurrentLocalization' [RFC3805]. Values of this new attribute MUST also be converted from the charset specified by the values of 'prtLocalizationCharacterSet' and 'prtGeneralCurrentLocalization' [RFC3805] to the charset specified by "charset-configured" (defaults to UTF-8 [RFC3629]).

In section 5, this document defines new keyword attribute values for "printer-state-reasons" [RFC2911] for Printer Subunits [RFC3805] and a new machine-readable attribute "printer-alert". Localization by the IPP Printer does NOT apply to these machine-readable attributes.

In section 6, this document defines new keyword attribute values for "printer-state-reasons" [RFC2911] for Finishing Subunits [RFC3806] and new corresponding enumerated attribute values for the 'PrtAlertCodeTC' textual convention [RFC3805] [IANAPRT]. Localization by the IPP Printer or SNMP Printer MIB Agent does NOT apply to these machine-readable attributes and values.

Therefore, this document conforms to 'IETF Policy on Character Sets and Languages' [RFC2277].

See section 7 'Internationalization Considerations' in [RFC2911] and section 8 'Internationalization Considerations' in [RFC3805].

10 Security Considerations

In section 5, this document defines extensions to one existing REQUIRED IPP Printer Description attribute "printer-state-reasons" defined in [RFC2911]. This document also defines two new RECOMMENDED IPP Printer Description attributes "printer-alert" and "printer-alert-description". All three are IPP Printer Description attributes as defined in [RFC2911]. See section 8 'Security Considerations' in [RFC2911].

In section 6, this document defines extensions to one existing REQUIRED Printer MIB columnar object 'prtAlertCode' defined in [RFC3805] via extensions to one existing textual convention 'PrtAlertCodeTC' defined in [IANAPRT]. See section 9 'Security Considerations' in [RFC3805].

11 Acknowledgements

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[WIMS-CIM] IEEE-ISTO PWG WIMS WG - CIM Refresh Project
     http://www.pwg.org/mailhelp.html - subscribe to WIMS mailing list
     ftp://www.pwg.org/wims/cim - archive of WIMS-CIM planning papers
     ftp://www.pwg.org/wims/wd - archive of WIMS-CIM working drafts

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ipp@pwg.org (subscribers only)

To subscribe, see the PWG web page:

http://www.pwg.org/mailhelp.html

15 Appendix A - Design Alternatives (Informative)

[[Editor:　To be published in final version]]

This section provides durable documentation of the 'road not taken' on various design alternatives during the development of this document.

15.1 Printer Alert Encoding in Collection Attribute

A note to the IPP WG mailing list on 19 July 2006 proposed an alternative to encode the columnar objects from 'prtAlertTable' in a new IPP Printer attribute using the 'collection' syntax defined in section 3 of [RFC3382].

15.1.1 Rationale for Rejection

The IPP WG rejected this proposal because it would make support of this document dependent on support for the IPP 'collection' syntax (not widely supported in IPP/1.1 [RFC2911] [RFC2910] implementations and not known to be supported in any IPP/1.0 [RFC2566] [RFC2565] implementation).

15.2 Printer Alert Encoding in New Object

A note to the IPP WG mailing list on 19 July 2006 proposed an alternative to encode the columnar objects from 'prtAlertTable' in a new first-class IPP object.

15.2.1 Rationale for Rejection

The IPP WG rejected this proposal because it would NOT be compatible with any deployed IPP implementation (because it would require a new IPP request attribute group over-the-wire).

15.3 Printer Alert Encoding in Parallel Attributes

A note to the IPP WG mailing list on 19 July 2006 proposed an alternative to encode the columnar objects from 'prtAlertTable' in an a set of ordered parallel IPP Printer attributes.

15.3.1 Rationale for Rejection

The IPP WG rejected this proposal because it would NOT be robust (because ordering is NOT required by the '1setOf X' syntax defined in section 4.1.6 of [RFC2911]) and would NOT be compatible with vendor extensions.

15.4 Printer Alert Encoding in State Message

The initial draft of this specification proposed an optimization (to avoid the definition of any new IPP Printer attributes) by overloading the existing IPP Printer attribute "printer-state-message" to encode columnar objects from 'prtAlertTable' in a structured string.

15.4.1 Rationale for Rejection

The IPP WG rejected this proposal because it would have forced IPP Printer "printer-state-message" values to be locale-independent (illegal for the 'text' syntax defined in section 4.1.1 of [RFC2911]).

15.5 Printer Alert Group Finishing Extensions

The initial draft of this specification proposed an optimization (to avoid the definition of many new Finishing Subunit-specific values of 'PrtAlertCodeTC' and IPP Printer attribute "printer-state-reasons") by defining one new value of 'PrtAlertGroupTC' for each value of of the IANA Finisher MIB 'FinDeviceTypeTC' (originally published in [RFC3806]) used in the non-index object 'finDeviceType' in 'finDeviceTable' and NOT included in 'prtAlertTable'.

15.5.1 Rationale for Rejection

The IPP WG rejected this optimization because it would have made IPP Printer "printer-state-reasons" values ambiguous for all Finishing Subunits (because the generic 'subunit-xxx' alert values were used).

15.6 Printer Alert Subset for Finishing Subunits

Previous versions of this document defined a subset of specific subunit alerts for each Finishing Subunit.

15.6.1 Rationale for Rejection

Lively discussion during the review at the PWG Lexington face-to-face (27 October 2006) resulted in a concensus to expand to a complete set of specific subunit alerts for each Finishing Subunit.

16 Appendix X - Change Log

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[[Editor:  To be deleted in final version]]

7 November 2006 (v0.40)


- Changed document status from 'Interim' to 'Prototype', per PWG
  Process/2.0;
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- Revised section 5.1.1 'Severity Suffixes Interoperability' for
  clarity;
- Revised Table 1 in section 5.1.2 'Existing Printer State Reasons for
  Alert Codes' to DEPRECATE all non-specific legacy one-way mappings,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Revised Table 2 in section 5.1.3 'New Printer State Reasons for
  Alert Codes' to DELETE all non-specific legacy one-way mappings,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Revised Table 3 in section 5.2.1 'Keywords for Alert Objects'
  conformance levels, to align with bindings of 'printerV2Alert' in
  Printer MIB, section 9 of IPP Event Notifications and Subcriptions
  [RFC3995], and WIMS-CIM work-in-progress mapping of Printer MIB,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Revised section 5.2.2. 'Printer Alert Encoding of Alert Objects'
  to specify explicit charset [US-ASCII], reference specific objects in
  'prtAlertTable', and clarify mapping details in ABNF expressions;
- Revised section 5.3.1 'Printer Alert Description Encoding' to specify
  REQUIRED copy of natural language tag and REQUIRED charset conversion
  to the value of "charset-configured" (i.e., current site policy)
- Revised section 6.1.1 'New Alert Codes for Finishing Subunits' to
  define complete set based on subunit generic alerts for every device,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Added new section 6.1.2 'Conventions for Alert Code Numbering' to
  explain conventions from Printer MIB and extensions in this document,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Revised section 7 'Conformance Requirements' to add explicit lists of
  of detailed conformance sections in this specification,
  per review at PWG face-to-face in Lexington (27 October 2006);
- Added new section 8.2 'IPP Printer Attributes - IANA Registrations'
  to register "printer-alert" and "printer-alert-description" with IANA;
- Revised section 9 'Internationalization Considerations' to reflect new
  "printer-alert" and "printer-alert-description" attributes.
- Revised section 10 'Security Considerations' to add details.
- Added new section 15.6 'Printer Alert Subset for Finishing Subunits'
  to explain changed strategy to complete set of specific alerts.

11 October 2006 (v0.30)

- Added 'staplerXxx' values to 'PrintAlertCodeTC' and 'stapler-xxx'
  values to "printer-state-reasons" IPP attribute in section 6.1.1
  (in addition to existing 'stitcherXxx' and 'sticher-xxx' values),
  to fix error in Finisher MIB, per request of Naoki Asada (Sharp);
- Added new special case conformance clause to section 6.1.1.2
  for mapping of 'stapler' and 'stitcher' finishing devices,
  to fix error in Finisher MIB, per request of Naoki Asada (Sharp);
- Added section 6.1.1.3 'Rationale for Stapler and Stitcher Devices',
  to fix error in Finisher MIB, per request of Naoki Asada (Sharp);

23 September 2006 (v0.20)

- Changed document status from 'Initial' to 'Interim', per PWG
  Process/2.0;
- Renamed document from 'IPP Printer State Reasons Extensions' to
  'IPP Printer State Extensions' (new state attributes are defined);
- Renamed section 1.1 from 'Background' to 'Problem Statement' for
  better alignment with project charter.
- Added formal definitions of 'IPP Client', 'IPP Printer', 'Printer MIB
  Agent', and 'Printer MIB Client' protocol roles to section 2.2
  'Printing Terminology', for unambiguous conformance requirements;
- Revised section 4 'Requirements' to align with new design requirements
  and preferred design alternatives, per concensus of IPP WG;
- Renamed section 5 from 'IPP Printer Attribute Extensions' to
  'IPP Printer Attributes' (new attributes are defined);
- Renamed section 6 from 'IANA Printer MIB Extensions' to
  'IANA Printer MIB Textual Conventions' (no new objects are defined);
- Deleted section 5.1.1 'Severity Suffixes DEPRECATED' and replaced with

  new section 5.1.1 'Severity Suffixes Interoperability', per comments
  from Ted Tronson (Novell) and Michael Sweet (Easy Software);
- Added section 5.1.4 'New Printer State Reasons for Finishing Subunits'
 that points to section 6.1.1 'New Alert Codes for Finishing Subunits'
- Deleted section 5.2 'printer-state-message(text(MAX))' and replaced
 with new section 5.2 'printer-alert(1setOf octetString(MAX))',
 per concensus of IPP WG;
- Deleted redundant prefix 'alert-' from all keywords defined for use in
 "printer-alert" in section 5.2, e.g., changing 'alert-code' to 'code'
 (no longer overloading general attribute "printer-state-message");
- Added new section 5.3 'printer-alert-description (1setOf text(MAX))',
 per concensus of IPP WG;
- Deleted section 6.1 'PrtAlertGroupTC' and replaced with new section
 6.1 'PrtAlertCodeTC', per concensus of IPP WG;
- Deleted section 6.1.1 'New Alert Groups for Finishing Subunits' and
 replaced with new section 6.1.1 'New Alert Codes for Finishing
 Subunits', per concensus of IPP WG;
- Revised section 9 'Internationalization Considerations' to reflect
 new "printer-alert-description" attribute;
- Added new section 'Appendix A - Design Alternatives (Informative)', to
 document the evolution of IPP WG concensus (i.e., the road not taken);

17 July 2006 (v0.10)

- initial draft