

31 May 2010
Candidate Standard 5107.2-2010



The Printer Working Group

PWG Command Set Format for IEEE 1284 Device ID v1.0

Status: Approved

Abstract: This document defines a standard format for the COMMAND SET capability in an IEEE 1284 Device ID [IEEE1284], for use: (a) by Imaging Systems (Printers, Copiers, Multifunction Devices, etc.) to encode their supported document formats; and (b) by Imaging Clients (workstations, mobile devices, spoolers, etc.) to decode these Imaging System supported document formats, to enable automatic device driver installation and subsequent Imaging Job submission.

This document also defines the IPP Printer Description attribute "printer-device-id" which contains an IEEE 1284 Device ID and corresponds one-to-one with the ppmPrinterIEEE1284DeviceId object defined in the PWG Printer Port Monitor MIB [PWG5107.1].

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

<ftp://ftp.pwg.org/pub/pwg/general/pwg-process-30.pdf>

This document is available at:

<ftp://ftp.pwg.org/pub/pwg/candidates/cs-ppm1284cmdset10-20100531-5107.2.pdf>

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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.

For additional information regarding the Printer Working Group visit: <http://www.pwg.org>

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

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1 Introduction (Informative)

This document defines a standard format for the COMMAND SET capability in an IEEE 1284 Device ID [IEEE1284], for use by: (a) Imaging Systems (Printers, Copiers, Multifunction Devices, etc.) to encode their supported document formats; and (b) Imaging Clients (workstations, mobile devices, spoolers, etc.) to decode these Imaging System supported document formats, to enable automatic device driver installation and subsequent Imaging Job submission.

This document also defines the IPP Printer Description attribute “printer-device-id” which contains an IEEE 1284 Device ID and corresponds one-to-one with the ppmPrinterIEEE1284DeviceId object defined in the PWG Printer Port Monitor MIB [PWG5107.1].

1.1 Background

IEEE 1284 [IEEE1284] defines the format for a Device ID string that includes a COMMAND SET capability (i.e., a list of supported document formats), however it does not provide any usage guidance or define standard keywords for specific document formats. This omission has caused interoperability problems and automatic installation problems in the Printer industry.

2 Terminology

2.1 Conformance Terminology

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

2.2 Printing Terminology

Normative definitions and semantics of printing terms are imported from the IETF Printer MIB v2 [RFC3805].

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

Imaging Client – Initiator of service and management requests and sender of outgoing service and management operation requests (e.g., an SNMP Manager).

Imaging System – Responder to service and management requests and receiver of incoming service and management operation requests (e.g., an SNMP Agent).

3 Requirements

Per the PWG Process [PWG-PROC], this section specifies the formal rationale for developing a PWG Command Set Format for IEEE 1284 Device ID strings, based on existing printing industry standards. This section also describes simple use models for this PWG Command Set Format

3.1 Rationale for 1284 Command Set Format

IETF, IEEE, and PWG printing standards define:

- (a) A standard abstract model for a network Printer in section 2.2 of the IETF Printer MIB v2 [RFC3805].
- (b) A standard augmentation for a network Printer in the PWG Printer Port Monitor MIB [PWG5107.1].
- (c) Standard keywords for document formats in the PrtInterpreterLangFamilyTC textual convention in the IANA Printer MIB [IANAPRT] (originally published in [RFC3805]).
- (d) Standard keywords for document formats in the IANA Registry of MIME Media Types [IANAMIME].
- (e) A standard encoding for machine-readable Printer Device capabilities (including supported document formats) in Section 7.6 Device ID of [IEEE 1284].
- (f) A standard protocol element for IEEE 1284 Device ID values in the ppmPrinterIEEE1284DeviceId object in the PWG Printer Port Monitor MIB [PWG5107.1].

Most network Printers support the IETF Printer MIB v1/v2 [RFC1759] [RFC3805]. Most newer network Printers also support the PWG Printer Port Monitor MIB [PWG5107.1]. However, the lack of a standard set of keywords for representing supported document formats in an IEEE 1284 Device ID prevents reliable installation of appropriate device drivers and other Imaging Client software.

Therefore, this document defines a standard format for encoding the Command Set (CMD) capability in an IEEE 1284 Device ID and a standard hierarchy for selecting the standard document format keywords – i.e., first from the IANA Printer MIB [IANAPRT] and then from the IANA Registry of MIME Media Types [IANAMIME].

3.2 Use Cases for 1284 Command Set Format

3.2.1 Network Spooler

A network spooler (typically running on a general-purpose network server along with other applications and supporting one or more downstream network Printers) may implement the PWG Printer Port Monitor MIB [PWG5107.1].

If the network spooler implements the PWG Printer Port Monitor MIB or any version of IPP, then it should encode and decode values of the 'ppmPrinterIEEE1284DeviceId' object or the "printer-device-id" IPP Printer Description attribute defined in section 5.2 of this specification according to the ABNF [RFC5234] defined in section 5.1 of this specification, in order to reliably install the correct device drivers and/or other Imaging Client software.

3.2.2 Network Printer

A network Printer (typically running an embedded operating system and possibly other Imaging Services) may implement the PWG Printer Port Monitor MIB [PWG5107.1].

If the network Printer implements the PWG Printer Port Monitor MIB or any version of IPP, then it should encode values of the 'ppmPrinterIEEE1284DeviceId' object or the "printer-device-id" IPP Printer Description

attribute defined in section 5.2 of this specification according to the ABNF [RFC5234] defined in section 5.1 of this specification, in order to reliably support device discovery and installation.

3.2.3 External Network Adapter with locally-attached Printer

An external network adapter (typically running an embedded operating system and supporting one or more locally-attached Printers) may implement the PWG Printer Port Monitor MIB [PWG5107.1].

If the external network adapter implements the PWG Printer Port Monitor MIB or any version of IPP and also conforms to this specification, then it should not change values of IEEE 1284 Device ID from USB or other local attachments, but should instead pass them through unchanged in the 'ppmPrinterIEEE1284DeviceId' object or the "printer-device-id" IPP Printer Description attribute defined in section 5.2 of this specification, in order to reliably support device discovery and installation (of the correct local Printer device driver).

3.3 Design Requirements for 1284 Command Set Format

The Command Set Format for IEEE 1284 Device ID defined in this specification:

- (1) should optimize compatibility with the ubiquitous implementations of the IETF Printer MIB v1/v2 [RFC1759] [RFC3805] in network Printers (see section 3.1).
- (2) should support primary document format keywords defined in the IANA Printer MIB [IANAPRT] (see section 3.1).
- (3) should support secondary document format keywords defined in the IANA Registry of MIME Media Types [IANAMIME] (see section 3.2).
- (4) should support tertiary private document format keywords for compatibility with existing practice.
- (5) should support automatic device driver installation by client and server operating systems (see section 3.2).
- (6) should support interoperable advertising of implemented document formats by network spoolers and network Printers (see sections 3.1 and 3.2).
- (7) should support interoperable discovery of available document formats by Imaging Clients and Imaging Servers (see sections 3.1 and 3.2).
- (8) should define a new IPP "printer-device-id" attribute that contains an IEEE 1284 Device ID, for automatic device driver installation by client and server operating systems (see section 3.2).

4 Relationship to Other Standards

This section describes the relationship between this specification and other public standards.

4.1 Relationship to PWG Printer Port Monitor MIB

Conforming Imaging Systems that also implement the PWG Printer Port Monitor MIB [PWG5107.1] MUST encode values of the COMMAND SET capability in the ppmPrinterIEEE1284DeviceId object in strict conformance with the ABNF specified in section 5 below.

4.2 Relationship to IETF Printer MIB

This document requires the use of enumerated string values registered in the PrtInterpreterLangFamilyTC textual convention in the IANA Printer MIB [IANAPRT] (originally published in [RFC3805]). Corresponding enumerated integer values registered in the PrtInterpreterLangFamilyTC textual convention are used in the prtInterpreterLangFamily object defined in the IETF Printer MIB v2 [RFC3805].

4.3 Relationship to IANA Registry of MIME Media Types

This document requires the use of enumerated string values registered in the IANA MIME Media Types Registry [IANAMIME].

4.4 Relationship to IETF Internet Printing Protocol

This document defines the new “printer-device-id” IPP Printer Description attribute in section 5.2 which can be included in future IPP specifications.

5 PWG Extensions to IEEE 1284 Device ID

5.1 Definition of Command Set Format in ABNF

Conforming implementations of this specification MUST encode and decode values of the COMMAND SET (CMD) capability in IEEE 1284 Device ID [IEEE1284] protocol elements in strict conformance with the following ABNF [RFC5234]. This specification only allows use of a subset of the original set of legal encoding characters defined in Section 7.6 of [IEEE1284].

Compatibility Warning: Conforming implementations of this specification SHOULD avoid encoding very long values (i.e., longer than 255 octets) of IEEE 1284 Device ID strings, in order to avoid known interoperability issues with existing system management and device installation tools. Although the PWG Printer Port Monitor MIB [PWG5107.1] does support IEEE 1284 Device ID strings up to 1023 octets, these very long values SHOULD NOT be generated.

Usage: Conforming implementations of this specification SHOULD use IANA Printer MIB Interpreter Types (primary) or MIME Media Types (secondary) instead of private types, for interoperability.

Implementors Note: Searching for an embedded forward slash '/' will distinguish MIME Media Types (present) from IANA Printer MIB Interpreter Types or private types (absent).

```

;
; ABNF for IEEE 1284 Device ID Command Set
;
command-set          = command-key ":" command-langs ";"
; IEEE 1284 command languages concatenated into one capability

command-key          = "COMMAND SET" / "CMD"
; IEEE 1284 command set keyword or abbreviation

command-langs       = command-lang *[ "," command-lang]
; IEEE 1284 command languages

command-lang        = interpreter-type / mime-media-type / private-type
; IEEE 1284 command language (job control or page description)

;
; Interpreter Types
;
interpreter-type     = *[ control-chars ] 1-59interpreter-chars
; Keyword from PRTInterpreterLangFamilyTC [IANAPRT]
; with deleted 'lang' prefix (e.g., 'PS' or 'PCL')
; Values MUST preserved original case

interpreter-chars    = ALPHA / DIGIT
; Alphanumeric with no punctuation

control-chars       = CR / LF / HTAB

;
; MIME Media Types
;
mime-media-type     = *[ control-chars ] type-name "/" subtype-name
; IANA Media Type [IANA-MIME] (e.g., 'text/plain') or
; Vendor Media Type (e.g., 'application/vnd.hp-pcl')
; Values MUST be converted to lowercase

```

```

;
; ABNF for MIME Media Types quoted from page 7 of [RFC4288]
;
type-name           = reg-name
subtype-name        = reg-name

reg-name            = 1-127reg-name-chars
reg-name-chars     = ALPHA / DIGIT / "!" /
                    "#" / "$" / "&" / "." /
                    "+" / "-" / "^" / "_"

;
; Private Types
;
private-type        = *[ control-chars ] 1*private-type-chars
private-type-chars = ALPHA / DIGIT / "-" / "_" / "."

```

5.2 IPP printer-device-id (text(1023))

This REQUIRED Printer attribute contains the IEEE 1284 Device ID [IEEE1284] of the Printer object, in a text encoding defined in Section 7.6 of [IEEE1284] and clarified in Section 5.1 above, and corresponds one-to-one with the ppmPrinterIEEE1284DeviceId object defined in the PWG Printer Port Monitor MIB [PWG5107.1]. This attribute allows the reliable installation of printer drivers and print filters on remote clients and spoolers.

Compatibility Warning: Conforming implementations of this specification SHOULD avoid encoding very long values (i.e., longer than 255 octets) of IEEE 1284 Device ID strings, in order to avoid known interoperability issues with existing system management and device installation tools. Although this IPP “printer-device-id” attribute does support IEEE 1284 Device ID strings up to 1023 octets, these very long values SHOULD NOT be generated.

6 Conformance Requirements

Conformance requirements for implementations of this specification are defined in the following sections.

6.1 Conformance for Network Spoolers and Network Printers

Conforming implementations of this specification in Network Spoolers and Network Printers:

- (1) MUST encode values of the COMMAND SET (CMD) capability in all IEEE 1284 Device ID [IEEE1284] protocol elements in strict conformance with the ABNF [RFC5234] defined in section 5.1.
- (2) MUST encode values of the COMMAND SET (CMD) capability in all IEEE 1284 Device ID [IEEE1284] protocol elements using registered IANA Printer MIB [IANAPRT] Interpreter Types (e.g., 'PS' or 'PCL'), whenever available, instead of using equivalent IANA registered [IANAMIME] or vendor MIME Media Types or private types.
- (3) MUST encode values of the COMMAND SET (CMD) capability, when selected from the IANA Printer MIB [IANAPRT], by preserving their original case exactly, for interoperability.
- (4) MUST encode values of the Command SET (CMD) capability, when selected from IANA registered [IANAMIME] or vendor MIME Media Types, by converting them to lowercase, for interoperability.

6.2 Conformance for External Network Adapters

Conforming implementations of this specification in External Network Adapters:

- (1) MUST NOT change values of IEEE 1284 Device ID strings received from locally-attached printers, but MUST instead pass them through unchanged in SNMP MIBs and all other network protocol interfaces.

6.3 Conformance for Imaging Clients

Conforming implementations of this specification in Imaging Clients:

- (1) MUST decode values of the COMMAND SET (CMD) capability in all IEEE 1284 Device ID [IEEE1284] protocol elements according to the ABNF [RFC5234] defined in section 5.1.
- (2) MUST decode values of the COMMAND SET (CMD) capability in all IEEE 1284 Device ID [IEEE1284] protocol elements, when using registered IANA Printer MIB Interpreter Types (e.g., 'PS' or 'PCL') [IANAPRT], by preserving their original case exactly, for interoperability.
- (3) MUST decode values of the COMMAND SET (CMD) capability in all IEEE 1284 Device ID [IEEE1284] protocol elements, when using IANA registered [IANAMIME] or vendor MIME Media Types, by converting them to lowercase, for interoperability.

7 IANA and PWG Considerations

There are no PWG considerations for this document.

This section contains the exact information for IANA to add to the IPP Registry according to the procedures defined in section 6 of IETF Internet Printing Protocol/1.1 Model and Semantics [RFC2911].

7.1 Attribute Registration

The attribute defined in this document will be published by IANA according to the procedures defined in section 6 of [RFC2911] with the following path:

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

The registry entry will contain the following information:

Section 9 (References)

```
[PWG5107.2] PWG Command Set Format for IEEE 1284 Device ID, PWG 5107.2,
             <month> 2010.
             ftp://ftp.pwg.org/pub/pwg/candidates/
             cs-pmp1284cmdset10-20100531-5107.2.pdf
```

Section 1 (Attributes)

Name (attribute syntax)	Reference	Section
-----	-----	-----
Printer Description attributes: printer-device-id (text(1023))	[PWG5107.2]	5.2

8 Internationalization Considerations

There are no internationalization considerations applicable to this document, because it only refers to a set of keywords (not localized) for printer languages and defines a standard format for using these keywords in the Command Set capability of an IEEE 1284 Device ID [IEEE1284]. Imaging Clients MAY localize the values of these keywords (e.g., the French translation of “Adobe Portable Document Format” for the “PDF” keyword), but such behavior is outside the scope of this document.

9 Security Considerations

There are no security considerations applicable to this document, because it only refers to a set of keywords (not localized) for printer languages and defines a standard format for using these keywords in the Command Set capability of an IEEE 1284 Device ID [IEEE1284]. Imaging Systems MAY support secure queries for the value of a IEEE 1284 Device ID in service and/or management protocols, but such behavior is outside the scope of this document.

10 References

10.1 Normative References

[IANAMIME]

IANA Registry of MIME Media Types per [RFC4288]
<ftp://ftp.iana.org/assignments/media-type>

[IANAPRT]

IANA Printer MIB (originally published in RFC 3805, June 2004).
<ftp://ftp.iana.org/assignments/ianaprinter-mib>

[IEEE1284]

Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers, IEEE 1284, January 2000.

[PWG5100.10]

PWG Internet Printing Protocol Version 2.0, PWG 5100.10, July 2009.
<ftp://ftp.pwg.org/pub/pwg/candidates/cs-ipp20-20090731-5100.10.pdf>

[PWG5107.1]

PWG Printer Port Monitor MIB, PWG 5107.1, October 2005.
<ftp://ftp.pwg.org/pub/pwg/candidates/cs-pmpportmib10-20051025-5107.1.pdf>

[PWG-PROC]

PWG Definition of the Standards Development Process Version 3.0, Jan 2009.
<ftp://ftp.pwg.org/pub/pwg/general/process/pwg-process30.pdf>

[RFC2911]

IETF Internet Printing Protocol/1.1 Model and Semantics, RFC 2911, September 2000.
<http://www.ietf.org/rfc/rfc2911.txt>

[RFC3805]

IETF Printer MIB v2, RFC 3805, June 2004 (OBSOLETES RFC 1759).
<http://www.ietf.org/rfc/rfc3805.txt>

[RFC4288]

IETF Media Type Specifications and Registration Procedures, RFC 4288, December 2005.
<http://www.ietf.org/rfc/rfc4288.txt>

[RFC5234]

IETF Augmented BNF for Syntax Specifications: ABNF, RFC 5234, January 2008.
<http://www.ietf.org/rfc/rfc5234.txt>

10.2 Informative References

[RFC1759]

IETF Printer MIB v1, RFC 1759, March 1995 (OBSOLETE by RFC 3805).
<http://www.ietf.org/rfc/rfc1759.txt>

11 Acknowledgments (Informative)

The editor would like to acknowledge the contributions of the following individuals to this specification: Glen Petrie (Epson), Michael Sweet (Apple/CUPS), Gail Giansiracusa (Kyocera), Jerry Thrasher (Lexmark), and William Wagner (TIC).

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