The Printer Working Group

April 25, 2025
IPP Registration

IPP Console Extensions v1.0 (CONSOLE)

Status: IPP Workgroup Approved

Abstract: This registration defines IPP attributes and values for the IETF Printer MIB v2 (RFC 3805) console properties and a URL for the corresponding embedded web server.

This registration is available electronically at:

https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ippconsole10-20250425.docx
https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ippconsole10-20250425.pdf

Title: *IPP Console Extensions v1.0 (CONSOLE)*

Table of Contents

List of Figures

List of Tables

1. Introduction

This registration defines IPP attributes and values for the IETF Printer MIB v2 [RFC3805] console properties and a URL for the corresponding embedded web server.

2. Terminology

2.1 Conformance Terminology

Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD, SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as defined in Key words for use in RFCs to Indicate Requirement Levels [BCP14]. This specification defines the following additional capitalized conformance terms:

CONDITIONALLY REQUIRED: A MUST conformance requirement that applies only when a specified condition is true.

DEPRECATED: A SHOULD NOT conformance requirement for previously defined and approved protocol elements that are planned to be removed from use.

OBSOLETE: A MUST NOT conformance requirement for previously defined and approved protocol elements that have been removed from use.

2.2 Printing Terminology

The following printing terms are used in this document:

Console: The physical control interface used to display the state of the Printer and change its settings. This can also refer to a network management service or protocol e.g. SNMPv3, HTTPS/HTML, SSH, etc. [RFC3805]

Logical Device: a print server, software service, or gateway that processes jobs and either forwards or stores the processed Job or uses one or more Physical Devices to render output [STD92].

Output Device: a single Logical or Physical Device [STD92].

Physical Device: a hardware implementation of an endpoint device, e.g., a marking engine, a fax modem, etc. [STD92]

2.3 Protocol Role Terminology

The following protocol roles are defined to specify unambiguous conformance requirements:

Client: Initiator of outgoing connections and sender of outgoing operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [STD99] User Agent) [STD92].

Printer: Listener for incoming connections and receiver of incoming operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [STD99] Server) that represents one or more Physical Devices or a Logical Device [STD92].

2.4 Acronyms and Organizations

This specification defines the following acronyms and organizations:

IANA: Internet Assigned Numbers Authority, https://www.iana.org/

IETF: Internet Engineering Task Force, https://www.ietf.org/

ISO: International Organization for Standardization, https://www.iso.org/

PWG: Printer Working Group, https://www.pwg.org/

3. Requirements

3.1 Rationale

Given the following existing specifications:

1. Internet Printing Protocol/1.1 [STD92]
2. Printer MIB v2 [RFC3805]

And given the need for viewing and/or accessing the Output Device console, the IPP Console Extensions v1.0 should:

1. Define attributes and values mapping the IETF Printer MIB v2 "prtConsole" properties; and
2. Define an attribute providing the URL of the Output Device's embedded web server home page.

3.2 Use Cases

3.2.1 View Output Device Console Remotely

Pat wants to monitor the consoles of multiple output devices in the department. Pat opens a printer management application to query the console display content of each output device and display them on their screen.

3.2.2 Configure and Monitor Output Device Remotely

Alex needs to configure an output device from their desktop computer. They open the URL advertised by the output device in a web browser application which displays the home page of the embedded web server. The home page typically displays the current status and configuration of the output device and provides controls for interacting with the device remotely.

3.3 Exceptions

All relevant exceptions are defined in the Internet Printing Protocol/1.1 [STD92].

3.4 Out of Scope

The following are considered out of scope for this registration:

1. Definition of new file formats; and
2. Definition of new protocol bindings.

3.5 Design Requirements

The design requirements for this registration are:

1. Define attributes and values to view the contents of the Output Device console;
2. Define an attribute that provides the URL of the Output Device's embedded web server home page;
3. Define security requirements necessary to support remote console access; and
4. Define sections to register all attributes and values with IANA.

4. Model

This registration defines IPP attributes and values for the IETF Printer MIB v2 [RFC3805] console properties and a URL for the corresponding embedded web server.

4.1 Remote Console Viewing

The IETF Printer MIB v2 [RFC3805] defines a console group of properties providing the current text display buffer and indicator light status. Table 1 lists the console attributes defined in this registration.

Table 1 - prtConsole Attributes

MIB Property	Printer Status Attribute	Reference
prtConsoleDisplayBufferTable	printer-console-display (1setOf text(MAX))	Section 5.1.1
prtConsoleLightTable	printer-console-light (1setOf octetString(MAX))	Section 5.1.2
prtConsoleDescription	printer-console-light-description (1setOf text(MAX))	Section 5.1.3

4.2 Embedded Web Server Access

Several existing IPP Printer Status attributes provide URLs for web pages served either by the Output Device or some other service that provide access to printer information, supplies, and policies. However, none of these attributes is defined exclusively as hosted by the Output Device or to provide access to all of the Output Device's configuration, informational, and status pages. The "printer-home-page-uri (uri)" Printer Status attribute (section 5.1.4) provides this information.

5. New Attributes

5.1 Printer Status Attributes

5.1.1 printer-console-display (1setOf text(MAX))

This CONDITIONALLY REQUIRED attribute provides the text for each line of the Output Device's console display. Printers that have a textual console display MUST support this attribute.

The values are mapped from the prtConsoleDisplayBufferText property and ordered according to the prtConsoleDisplayBufferIndex property [RFC3805].

The Printer MUST provide values in the character set specified by the "charset-configured" operation attribute [STD92], which might require conversion from the character set specified by prtGeneralCurrentLocalization [RFC3805] and prtLocalizationCharacterSet [RFC3805].

The Printer MUST set the naturalLanguage part for each value to match the natural language specified by prtGeneralCurrentLocalization [RFC3805], prtLocalizationLanguage [RFC3805], and prtLocalizationCountry [RFC3805].

5.1.2 printer-console-light (1setOf octetString(MAX))

This CONDITIONALLY REQUIRED attribute provides the current state of any indicator lights on the Output Device's console. Printers that have indicator lights MUST support this attribute.

This attribute MUST have the same cardinality (contain the same number of values) as the "printer-console-light-description" attribute (section 5.1.3). The i^{th} value in the "printer-console-light" attribute corresponds to the i^{th} value in the "printer-console-light-description" attribute.

Each string contains an unordered sequence of key/value pairs, structured according to the ABNF [STD68] in Figure 1. Table 2 lists the keys defined in this specification, which are derived from the relevant machine-readable (non-localized) columnar objects from the prtConsoleLightTable object defined in IETF Printer MIB v2 [RFC3805]. A Printer MAY supply site-unique or vendor-unique information using the "light-ext" rule defined in the ABNF. The ABNF is also available externally [ABNF].

Table 2 - "printer-console-light" Keys

Key	IPP Datatype	Printer MIB Object	Conformance
color	String	prtConsoleColor	REQUIRED
offTime	Integer	prtConsoleOffTime	REQUIRED
onTime	Integer	prtConsoleOnTime	REQUIRED

A Printer MUST encode the values of "printer-supply" using the Net-ASCII subset of the US-ASCII character set [RFC5198]. A Printer MUST NOT supply values that contain characters in the range 0x00 - 0x1F or 0x7F.

Figure 1 - ABNF for "printer-console-light" Values

```
printer-console-light = *light-required *[light-optional]
    ; set of console light elements encoded into one value

light-required = light-req ";"
light-req      = light-color /
                 light-off-time /
                 light-on-time

light-optional = light-opt ";"
light-opt      = light-ext

light-color    = "color" "=" 1*ALPHA
    ; string value as an alpha string mapped directly from
    ; prtConsoleColor in [RFC3805]

light-off-time = "offTime" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; prtConsoleOffTime in [RFC3805]

light-on-time  = "offTime" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; prtConsoleOnTime in [RFC3805]

light-ext      = light-extname "=" light-extvalue
    ; extension point for other MIB values not mapped
    ; or site-unique / vendor-unique additional info
light-extname  = 1*[ALPHA / DIGIT / "-"]
light-extvalue = 1*[ALPHA / DIGIT / "-" / "." / ","]
```

5.1.2.1 Color Names in printer-console-light

Color names MUST conform to the color names and conventions defined in the PWG Media Standardized Names v2.1 (MSN) [PWG5101.1].

5.1.2.2 Example of printer-console-light

Figure 2 shows three rows of machine-readable (non-localized) columnar objects from prtConsoleLightTable encoded into the corresponding values of "printer-console-light", presented using the "PAPI" textual syntax encoding [PAPI].

Note: Line breaks are shown below for readability of this example. The 'nl' (0x0A) and 'lf' (0x0D) characters are among those disallowed for "printer-supply".

Figure 2 - Example Values for "printer-console-light"

```
printer-console-light[1] = "color=green;onTime=500;offTime=500;"
printer-console-light[2] = "color=red;onTime=0;offTime=1;"
printer-console-light[3] = "color=blue;onTime=1;offTime=0;"
```

5.1.3 printer-console-light-description (1setOf text(MAX))

This CONDITIONALLY REQUIRED attribute provides the textual descriptions of any indicator lights on the Output Device's console. Printers that have indicator lights MUST support this attribute.

This attribute MUST have the same cardinality (contain the same number of values) as the "printer-console-light" attribute (section 5.1.2). The i^{th} value in the "printer-console-light-description" attribute corresponds to the i^{th} value in the "printer-console-light" attribute.

The Printer MUST provide values in the character set specified by the "charset-configured" operation attribute [STD92], which might require conversion from the character set specified by prtGeneralCurrentLocalization [RFC3805] and prtLocalizationCharacterSet [RFC3805].

The Printer MUST set the naturalLanguage part for each value to match the natural language specified by prtGeneralCurrentLocalization [RFC3805], prtLocalizationLanguage [RFC3805], and prtLocalizationCountry [RFC3805].

5.1.3.1 Example of printer-console-light-description

Figure 3 shows three rows of the "printer-console-light-description" values corresponding to the "printer-console-light" values from

Figure 2, presented using the "PAPI" textual syntax encoding [PAPI].

Note: The naturalLanguage part of each textWithLanguage value is not illustrated in this example.

Figure 3 - Example Values for "printer-console-light-description"

```
printer-console-light-description[1] = "Printing"
printer-console-light-description[2] = "Printer Error"
printer-console-light-description[3] = "Wi-Fi Connected"
```

5.1.4 printer-home-page-uri (uri)

This CONDITIONALLY REQUIRED attribute provides the URI of the Printer-resident embedded web server's home page. Printers with an active embedded web server MUST support this attribute.

Printers MUST return an absolute URI, i.e., "http://ex12ab34cd56ef.local:631/home" is acceptable but "//home" is not.

Printers accessed via Universal Serial Bus [IPP-USB] MUST use the "localhost" hostname with the same port number for IPP and HTTP URIs as supplied in the HTTP Host: field.

Printers SHOULD use the HTTP Host: header value in the returned URI.

Printers SHOULD return a "http" URI when responding to requests using the "ipp" URI scheme and a "https" URI when responding to requests using the "ipps" URI scheme.

Printers MUST NOT return a URI with a link-local address unless it is taken from the HTTP Host: field.

Printers SHOULD NOT return a URI with an IP address obtained via Dynamic Host Configuration Protocol (DHCP) [RFC2131] or other auto-configuration protocols unless it is taken from the HTTP Host: field.

6. Conformance Requirements

6.1 Printer Conformance Requirements

In order for a Printer to claim conformance to this document, a Printer MUST support:

1. The required Printer Status attributes defined in section 5.1;
2. The internationalization considerations defined in section 0; and
3. The security considerations defined in section 8.

6.2 Client Conformance Requirements

In order for a Client to claim conformance to this document, a Client MUST support:

1. The required Printer Status attributes defined in section 5.1;
2. The internationalization considerations defined in section 0; and
3. The security considerations defined in section 8.

7. Internationalization Considerations

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

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

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

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

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

Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical

Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping

Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]

Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences

Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization

Unicode Collation Algorithm [UTS10] – sorting

Unicode Locale Data Markup Language [UTS35] – locale databases

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

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

Unicode Character Property Model [UTR23] – character properties

Unicode Conformance Model [UTR33] – Unicode conformance basis

8. Security and Privacy Considerations

The IPP extensions defined in this document require the same security and privacy considerations as defined in the Internet Printing Protocol/1.1 [STD92].

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

> Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
>
> Implementations of this specification are advised to also review the following informational document on processing of human-readable Unicode text strings:
>
> Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

9. IANA Considerations

9.1 Attribute Registrations

The attributes defined in this registration will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

> https://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

```
Printer Status attributes:                                    Reference
------------------------------                                ---------
printer-console-display (1setOf text(MAX))                    [CONSOLE]
printer-console-light (1setOf octetString(MAX))               [CONSOLE]
printer-console-light-description (1setOf text(MAX))          [CONSOLE]
printer-home-page-uri (uri)                                   [CONSOLE]
```

10. References

10.1 Normative References

[BCP14] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119/BCP 14, March 1997, https://datatracker.ietf.org/doc/html/rfc2119

[IPP-USB] "USB Print Interface Class IPP Protocol Specification Revision 1.0", December 2012, https://www.usb.org/document-library/ipp-protocol-10

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

[PWG5101.1] M. Sweet, "PWG Media Standardized Names v2.1 (MSN)", PWG 5101.1-2023, September 2023, https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn21-20230915-5101.1.pdf

[RFC2131] R. Droms, "Dynamic Host Configuration Protocol", RFC 2131, March 1997, https://datatracker.ietf.org/doc/html/rfc2131

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

[STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, https://datatracker.ietf.org/doc/html/rfc3629

[STD66] T. Berners-Lee, R. Fielding, L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", RFC 3986/STD 66, January 2005, https://datatracker.ietf.org/doc/html/rfc3986

[STD68] D. Crocker, P. Overell; "Augmented BNF for Syntax Specifications: ABNF", STD 68/RFC 5234, January 2008, https://datatracker.ietf.org/doc/html/rfc5234

[STD92] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", RFC 8010/RFC 8011/STD 92, June 2018, https://datatracker.ietf.org/doc/html/rfc8010, https://datatracker.ietf.org/doc/html/rfc8011

[STD99] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", RFC 9112/STD 99, June 2022, https://datatracker.ietf.org/doc/html/rfc9112

[UAX9] Unicode Consortium, “Unicode Bidirectional Algorithm”, UAX#9, September 2024, https://www.unicode.org/reports/tr9

[UAX14] Unicode Consortium, “Unicode Line Breaking Algorithm”, UAX#14, September 2024, https://www.unicode.org/reports/tr14

[UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode Standard Annex 15, August 2024, https://www.unicode.org/reports/tr15

[UAX29] Unicode Consortium, “Unicode Text Segmentation”, UAX#29, August 2024, https://www.unicode.org/reports/tr29

[UAX31] Unicode Consortium, “Unicode Identifier and Pattern Syntax”, UAX#31, September 2024, https://www.unicode.org/reports/tr31

[UNICODE] Unicode Consortium, "Unicode Standard", Version 16.0.0, September 2024, https://www.unicode.org/versions/Unicode16.0.0/

[UTS10] Unicode Consortium, “Unicode Collation Algorithm”, UTS#10, August 2024, https://www.unicode.org/reports/tr10

[UTS35] Unicode Consortium, “Unicode Locale Data Markup Language”, UTS#35, March 2025, https://www.unicode.org/reports/tr35

[UTS39] Unicode Consortium, “Unicode Security Mechanisms”, UTS#39, September 2024, https://www.unicode.org/reports/tr39

10.2 Informative References

[ABNF] M. Sweet, "ABNF for IPP Console Extensions v1.0 (CONSOLE)", https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ippconsole10-abnf-20250425.txt

[PAPI] A. Hlava, N. Jacobs, M. Sweet, "Open Standard Print API (PAPI)", July 2005, https://prdownloads.sourceforge.net/openprinting/PAPI-specification.pdf?download

[UTR17] Unicode Consortium “Unicode Character Encoding Model”, UTR#17, November 2022, https://www.unicode.org/reports/tr17

[UTR23] Unicode Consortium “Unicode Character Property Model”, UTR#23, November 2022, https://www.unicode.org/reports/tr23

[UTR33] Unicode Consortium “Unicode Conformance Model”, UTR#33, May 2025, https://www.unicode.org/reports/tr33

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

11. Author

Primary author:

Michael Sweet
Lakeside Robotics Corporation

