PROJ Title of Document
(Acronym)

Status: Initial

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https://ftp.pwg.org/pub/pwg/general/templates/wd-template.docx

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To meet this objective, the PWG documents the results of their work as open standards that define print related protocols, interfaces, procedures, and conventions. A PWG standard is a stable, well understood, and technically competent specification that is widely used with multiple independent and interoperable implementations. Printer manufacturers and vendors of printer related software benefit from the interoperability provided by voluntary conformance to these standards.

For additional information regarding the Printer Working Group visit:

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

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Table 1 - An Example Table 4

1. Introduction

Provide an introduction for the document.

Figure 1 - An Example Figure

Table 1 - An Example Table Using the PWG Table Style

| Keyword | Description | Conformance |
| --- | --- | --- |
| One | The first keyword | REQUIRED |
| Two | The second keyword | OPTIONAL |

Updated specifications also include a summary of changes from the prior version with a link to the changes section.

This specification updates the previous version of this specification [PWG5100.STD-YYYY]. A list of changes can be found in section 14.

1. Terminology
	1. Conformance Terminology

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

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

* 1. Printing Terminology

Normative definitions and semantics of printing terms are imported from the Internet Printing Protocol/1.1 [STD92].

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

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

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

*Output Device*: a single Logical or Physical Device

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

* 1. 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 [RFC7230] User Agent).

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

* 1. Other Terminology

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

* 1. 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/>

1. Requirements
	1. Rationale

Given the following existing specifications:

1. Title of First Specification [REFERENCE1]
2. Title of Second Specification [REFERENCE2]
3. ...
4. Title of Nth Specification [REFERENCEN]

And given the need for WHAT YOU NEED, the TITLE OF DOCUMENT should:

1. Provide foo,
2. Define bar, and
3. Define bla.
	1. Use Cases

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

* 1. Exceptions

The following subsections define exceptions in addition to those defined in the Internet Printing Protocol/1.1 [STD92].

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

* 1. Out of Scope

The following are considered out of scope for this specification:

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

The design requirements for this specification are:

1. Define attributes and values to describe ...;
2. Define operations for ...;
3. Define security requirements necessary to support ...; and
4. Define sections to register all attributes, values, and operations with IANA.

The design recommendations for this specification are:

1. Support additional "nice to have" use cases
2. Model

Provide detailed data model and semantic information starting in section 4. Definition of data elements/attributes and operations happen in later sections.

1. New Attributes

Section 2.3.2 of RFC 8011 specifies rules for IPP attributes:

* Attribute names are keywords formed from English words starting with a letter followed by more letters, numbers, dashes ("-"), dots ("."), and/or underscores ("\_"). Standards shouldn't use vendor prefixes.
* Attribute names are shown with double quotes, e.g., "attribute-name".
* Attribute values are shown with single quotes, e.g., 'true', '42', and 'some-keyword'.
* Job and Document Template attributes are normallly paired with "xxx-default" and "xxx-supported" Printer Description attributes.
* Some Printer Configuration attributes that configure the operation of the Printer are named "xxx-configured" with an "xxx-supported" Printer Description attribute listing the supported values.

Also from section 5.2 of RFC 8011:

* The "xxx" in each "xxx-supported" attribute name is singular even through an "xxx-supported" attribute usually has more than one value, such as "print-quality-supported", unless the "xxx" Job Template attribute is plural, such as "finishings" or "sides". In such cases, the "xxx-supported" attribute names are "finishings-supported" and "sides-supported".

Some additional guidance since RFC 8011 on collections:

* Collection attributes are normally named "xxx-col"; we haven't always been consistent in the past but (at least for Job/Document Template attributes) the current guidance is to put "-col" on the end of the name
* "xxx-col-supported" always has the syntax "(1setOf keyword)" and lists the supported member attributes of the "xxx-col" attribute. "xxx-col-database" and "xxx-col-ready", if applicable, are used to list the supported and ready combinations of member attributes and values.
* Member attributes are normally prefixed with the base name of the collection, for example "media-size", "media-source", and "media-type" for the "media-col" collection.
* Each member attribute "yyy" usually has a corresponding "yyy-supported" Printer Description attribute unless the member attribute syntax specifies a range or type of values.
	1. Operation Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

[REQUEST ATTRIBUTES ONLY] A Client includes this attribute in a Foo (section N.N) request.

[RESPONSE ATTRIBUTES ONLY] A Printer includes this attribute in a Foo (section N.N) response.

* + 1. attribute-name (type2 keyword)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. The following keywords are defined by this specification:

'value-1': A description of the first value

'value-2': A description of the second value

* 1. Document Description Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute contains ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Document Status Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute contains ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Document Template Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* + 1. attribute-name (type2 keyword)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. The following keywords are defined by this specification:

'value-1': A description of the first value

'value-2': A description of the second value

* + 1. collection-name-col (collection)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. Table N lists the member attributes.

Table 2 - Member attributes for "collection-name-col"

|  |  |
| --- | --- |
| **Name** | **Conformance** |
| collection-name-foo (syntax) | REQUIRED |
| collection-name-bar (syntax) | RECOMMENDED |

* + - 1. collection-name-foo (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED member attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* + - 1. collection-name-bar (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED member attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Job Description Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute contains ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Job Status Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute contains ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Job Template Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* + 1. attribute-name (type2 keyword)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. The following keywords are defined by this specification:

'value-1': A description of the first value

'value-2': A description of the second value

* + 1. collection-name-col (collection)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. Table N lists the member attributes.

Table 3 - Member attributes for "collection-name-col"

|  |  |
| --- | --- |
| **Name** | **Conformance** |
| collection-name-bar (syntax) | REQUIRED |
| collection-name-foo (syntax) | RECOMMENDED |

* + - 1. collection-name-bar (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED member attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* + - 1. collection-name-foo (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED member attribute specifies ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* 1. Printer Description Attributes
		1. attribute-name-configured (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute contains the currently configured ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

* + 1. attribute-name-default (syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute contains the default value for the "attribute-name" Job Template attribute (section N.N). [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. [OPTIONAL/RECOMMENDED ONLY] A Printer that supports the "attribute-name" Job Template attribute MUST support this attribute.

[IF APPLICABLE] The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied [STD92].

* + 1. attribute-name-supported (1setOf syntax)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute lists the supported values of the "attribute-name" operation/Job Template, Job/Document Template/Printer Description attribute (section N.N). [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. [OPTIONAL/RECOMMENDED ONLY] A Printer that supports the "attribute-name" Job Template attribute MUST support this attribute.

[IF APPLICABLE] The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied [STD92].

* + 1. attribute-name-supported (boolean)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute indicates whether the "attribute-name" operation/Job Template, Job/Document Template/Printer Description attribute (section N.N) is supported. [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. [OPTIONAL/RECOMMENDED ONLY] A Printer that supports the "attribute-name" Job Template attribute MUST support this attribute.

[IF APPLICABLE] The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied [STD92].

* + 1. collection-name-supported (1setOf keyword)

This OPTIONAL/RECOMMENDED/REQUIRED/CONDITIONALLY REQUIRED attribute lists the supported member attributes of the "collection-name" operation/Job Template, Job/Document Template/Printer Description attribute (section N.N). [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. [OPTIONAL/RECOMMENDED ONLY] A Printer that supports the "collection-name" Job Template attribute MUST support this attribute.

* + 1. collection-name-bar-supported (1setOf syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute lists the supported values of the "collection-name-bar" member attribute (section N.N). [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute. [OPTIONAL/RECOMMENDED ONLY] A Printer that supports the "collection-name-bar" member attribute MUST support this attribute.

[IF APPLICABLE] The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied [STD92].

* 1. Printer Status Attributes
		1. attribute-name (syntax)

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED attribute contains the current ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this attribute.

1. New Operations
	1. Operation-Name

This OPTIONAL/RECOMMENDED/CONDITIONALLY REQUIRED operation ... [CONDITIONALLY REQUIRED ONLY] A Printer that supports Named Feature MUST support this operation.

[ADMIN OPERATIONS ONLY] Access Rights: The authenticated user [STD92] performing this operation MUST be an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

[JOB OPERATIONS ONLY] Access Rights: The authenticated user [STD92] performing this operation MUST be the Job owner or an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

* + 1. Operation-Name Request

The following groups of attributes are part of an Operation-Name request:

Group 1: Operation Attributes

"attributes-charset" (charset) and
"attributes-natural-language" (naturalLanguage):

The Client MUST supply and the Printer MUST support both of these attributes.

Target:

[PRINTER OPERATIONS] The "printer-uri" (uri) operation attribute which is the target Printer for the operation.

[JOB OPERATIONS] The "printer-uri" (uri) and "job-id" (integer) operation attributes which are the target Job for the operation.

[SYSTEM OPERATIONS] The "system-uri" (uri) operation attribute which is the target System for the operation.

"attribute name" (syntax):

The Client MUST/MAY supply and the Printer/System MUST support ...

[AS NEEDED] Group N: Document/Job/Printer/System Attributes

"attribute-name" (syntax):

The Client MUST/MAY supply and the Printer/System MUST support ...

* + 1. Operation-Name Response

The following groups of attributes are part of an Operation-Name response:

Group 1: Operation Attributes

"attributes-charset" (charset) and
"attributes-natural-language" (naturalLanguage):

The Printer MUST return both of these attributes.

"status-message" (text(255)) and/or
"detailed-status-message" (text(MAX)):

The Printer MAY return one or both of these attributes.

Group 2: Unsupported Attributes

See [STD92] for details on returning Unsupported Attributes.

[AS NEEDED] Group N: Document/Job/Printer/System Attributes

"attribute-name" (syntax):

The Printer/System MAY/MUST return ...

1. New Values for Existing Attributes
	1. attribute-name (syntax)

This specification defines the following additional values for the "attribute-name" operation/Document/Job/Printer/System attribute [REFERENCE]:

'one-fish': Description and semantics

'two-fish': Description and semantics

'red-fish': Description and semantics

'blue-fish': Description and semantics

1. Obsolete Attributes, Operations, and Values

This section is present only for document updates where attributes, operations, and/or values are being made obsolete. We normally first DEPRECATE an item and then OBSOLETE it in a subsequent update, unless the item poses obvious security or interoperability issues.

Add a subsection for groups of attributes, operations, and values as needed.

1. Additional Semantics for Existing Operations
	1. Operation-Name: attribute-name

This specification adds additional semantics when a Client submits an Operation-Name request with the "attribute-name" operation attribute (section N.N). When supplied, a Printer MUST:

1. Numbered list of things a Printer must do
2. Foo
3. Bar
4. Conformance Requirements
	1. Printer Conformance Requirements

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

1. The required attributes and values defined in section ??;
2. The required operations defined in section ??;
3. The additional values defined in section ??;
4. The internationalization considerations defined in section 6; and
5. The security considerations defined in section 7.
	1. Client Conformance Requirements

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

1. The required attributes and values defined in section ??;
2. The required operations defined in section ??;
3. The additional values defined in section ??;
4. The internationalization considerations defined in section 6; and
5. The security considerations defined in section 7.
6. Internationalization Considerations

Tailor the following standard 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

1. Security Considerations

Provide security considerations for this specification, such as the following.

The IPP extensions defined in this document require the same security 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

1. IANA Considerations
	1. Attribute Registrations

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

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

The registry entries will contain the following information:

Document Description attributes: Reference

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

name (type) [REFERENCE]

Document Status attributes: Reference

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

name (type) [REFERENCE]

Document Template attributes: Reference

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

name (type) [REFERENCE]

Job Description attributes: Reference

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

name (type) [REFERENCE]

Job Status attributes: Reference

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

name (type) [REFERENCE]

Job Template attributes: Reference

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

name (type) [REFERENCE]

Operation attributes: Reference

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

name (type) [REFERENCE]

Printer Description attributes: Reference

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

name (type) [REFERENCE]

Printer Status attributes: Reference

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

name (type) [REFERENCE]

Subscription Description attributes: Reference

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name (type) [REFERENCE]

Subscription Status attributes: Reference

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

name (type) [REFERENCE]

Subscription Template attributes: Reference

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name (type) [REFERENCE]

* 1. Type2 keyword Registrations

The keyword values defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following location:

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

The registry entries will contain the following information:

Attributes (attribute syntax)

 Keyword Attribute Value Reference

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

name (type2 keyword) [REFERENCE]

 value-1 [REFERENCE]

 value-2 [REFERENCE]

name-supported (1setOf type2 keyword) [REFERENCE]

 < all name values > [REFERENCE]

* 1. Type2 enum Registrations

The enum values defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following location:

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

The registry entries will contain the following information:

Attributes (attribute syntax)

 Enum Value Enum Symbolic Name Reference

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name (type2 enum) [REFERENCE]

 3 value-3 [REFERENCE]

 4 value-4 [REFERENCE]

operations-supported (1setOf type2 enum) [RFC8011]

 0xXXXX Operation-Name [REFERENCE]

* 1. Operation Registrations

The operations defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following location:

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

The registry entries will contain the following information:

Operation Name Reference

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Operation-Name [REFERENCE]

Existing-Operation-Name (Extension) [REFERENCE]

* 1. Status Code Registrations

The status codes defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following location:

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

The registry entries will contain the following information:

Value Status Code Name Reference

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

0x0400:0x04FF - Client Error:

 0x04XX client-error-name [REFERENCE]

0x0500:0x05FF - Server Error:

 0x05XX server-error-name [REFERENCE]

1. Overview of Changes

This section is only present in updated specifications.

* 1. Title of Standard v1.1

The following changes were made to the previous version of this specification [PWG5100.STD-YYYY]:

* Thing one
* Thing two
1. References
	1. Normative References

[REFERENCE] F. Last author list or standards body, "Title of referenced document", Document Number, Month YYYY, URL (if any)

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

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

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

[RFC7230] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", RFC 7230, June 2014, <https://tools.ietf.org/html/rfc7230>

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

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

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

[UAX9] Unicode Consortium, “Unicode Bidirectional Algorithm”, UAX#9, February 2019, <https://www.unicode.org/reports/tr9>

[UAX14] Unicode Consortium, “Unicode Line Breaking Algorithm”, UAX#14, February 2019, <https://www.unicode.org/reports/tr14>

[UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode Standard Annex 15, February 2019, <https://www.unicode.org/reports/tr15>

[UAX29] Unicode Consortium, “Unicode Text Segmentation”, UAX#29, February 2019, <https://www.unicode.org/reports/tr29>

[UAX31] Unicode Consortium, “Unicode Identifier and Pattern Syntax”, UAX#31, February 2019, <https://www.unicode.org/reports/tr31>

[UNICODE] Unicode Consortium, "Unicode Standard", Version 12.0.0, March 2019, <https://www.unicode.org/versions/Unicode12.0.0/>

[UTS10] Unicode Consortium, “Unicode Collation Algorithm”, UTS#10, April 2019, <https://www.unicode.org/reports/tr10>

[UTS35] Unicode Consortium, “Unicode Locale Data Markup Language”, UTS#35, March 2019, <https://www.unicode.org/reports/tr35>

[UTS39] Unicode Consortium, “Unicode Security Mechanisms”, UTS#39, May 2019, <https://www.unicode.org/reports/tr39>

* 1. Informative References

The following reference is only present for updated documents (once per version)

[PWG5100.STD-YYYY]
F. Last author list, "Title of Standard", PWG 5100.STD-YYYY, Month YYYY, URL

[REFERENCE] F. Last author list or standards body, "Title of referenced document", Document Number, Month YYYY, URL (if any)

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

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

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

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

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The authors would also like to thank the following individuals for their contributions to this specification:

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1. Change History

This section will be removed when this document is published.

* 1. Month, DD, YYYY

Initial revision.