The Printer Working Group

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IPP Registration

IPP Get-User-Printer-Attributes (*GUPA*)

Status: IPP WG Approved

Abstract: This registration defines the Get-User-Printer-Attributes IPP operation, which allows an IPP Client to retrieve the Printer's attributes and capabilities that are available specifically to the Client's most authenticated User.

This document is available electronically at:

https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ippgupa-20171214.odt
https://ftp.pwg.org/pub/pwg/ipp/registrations/reg-ippgupa-20171214.pdf

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1 Introduction

This IPP Registration defines the Get-User-Printer-Attributes IPP operation, which allows an IPP Client to retrieve the Printer's attributes and capabilities that are available specifically to the Client's most authenticated User. It is semantically analogous to the existing Get-Printer-Attributes IPP operation [RFC8011], with the key difference that the Printer could respond with an authentication challenge.

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]. The term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that applies when a specified condition is true.

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 Internet Printing Protocol/1.1: Model and Semantics [RFC8011].

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 an endpoint device, e.g., a marking engine, a fax modem, etc.

2.3 Protocol Role Terminology

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

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

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

2.4 Other Terms Used in This Document

User: A person or automata using a Client to communicate with a Printer.

2.5 Acronyms and Organizations

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

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

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

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

3 Requirements

3.1 Rationale

While there are many proprietary print policy solutions that provide a way to specify allowed or disallowed features according to individual users, systems, applications, and so forth, there is no established standard method using IPP. IPP ecosystems would benefit from having such a print policy method to better support systems such as IPP Everywhere™ [PWG5100.14] in print infrastructures provided by public print providers, enterprises or university settings.

Technical justification for pursuing the creation of a new IPP operation rather than reusing or overloading existing operations such as Get-Printer-Attributes is discussed in section 4.

3.2 Use Cases

The need for solutions to these use cases emerged during the process of writing the IPP Implementor's Guide v2 [PWG5100.19].

3.2.1 Print Policy For Some Users Limits Print Capabilities

Sue wants to print her report on her department's workgroup printer. She wants to print it in color to make the color graphs look best. However, she has abused her printing privileges, so her department head has instructed the network administrator to restrict her user account's ability to print in color.

Sue opens the document on her laptop, chooses to print, and selects the department's workgroup printer. The Printer authenticates the laptop using Sue's credentials, and then provides the laptop with the print choices available for Sue's account, which does not include color printing. Sue decides whether to print it in black-and-white anyway or to print from one of the campus print centers, where she can pay to print in color.

Bob is an associate professor in the same department as Sue. His account has no limitations for color printing. He opens a document on his tablet, taps to print, and selects the department's workgroup printer. His tablet presents print options including the option of printing in color. Bob chooses to print in color, and prints his document, which prints in color as he expects.

Figure 3.1 illustrates this use case with a sequence diagram.

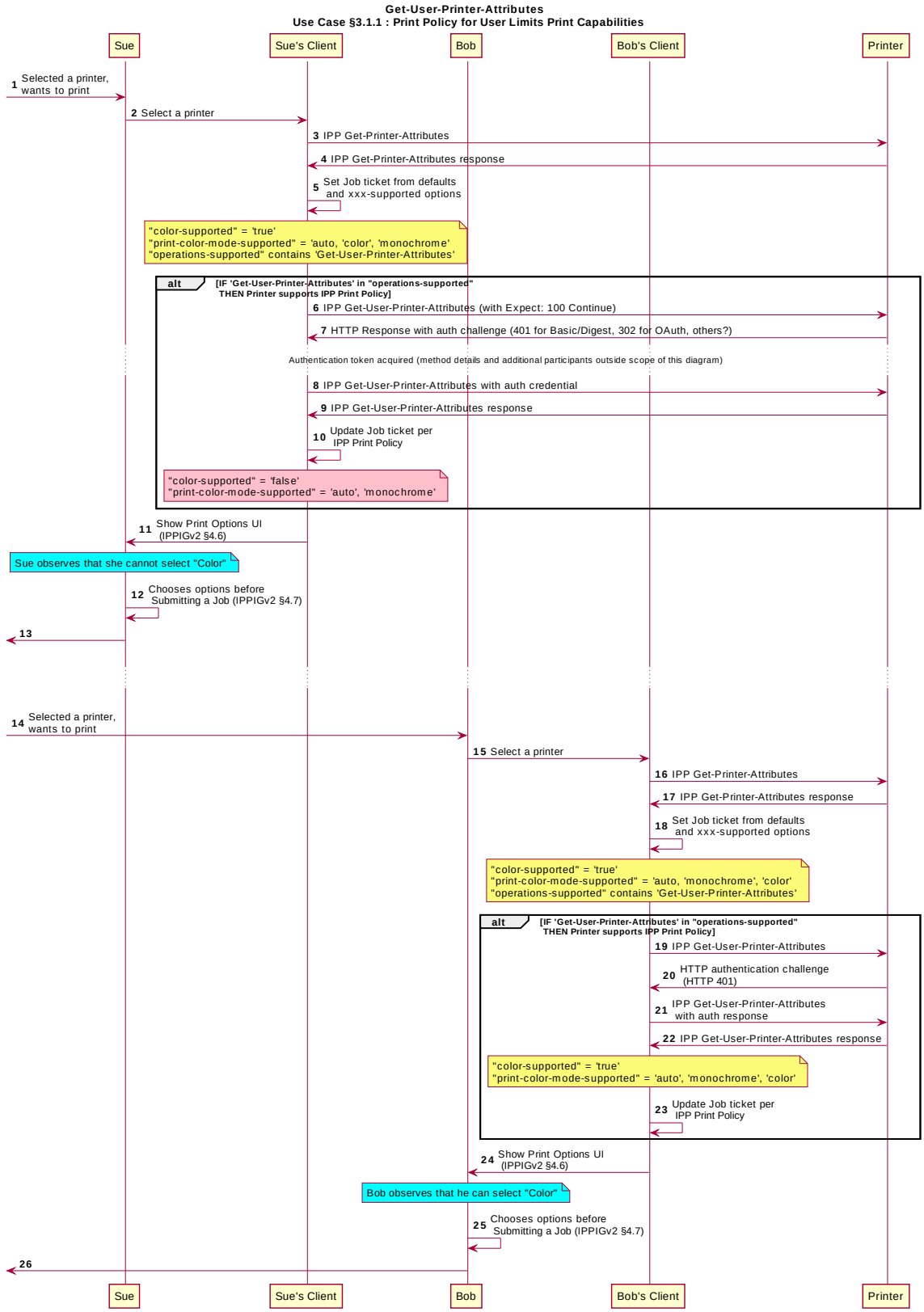

Figure 3.1 : Use Case 3.1.1 Sequence Diagram

3.2.2 User Not Listed in Print Policy Denied Ability to Print in Color

In this use case, a user who is not named in the print policy system is denied the ability to print using existing conventional IPP print protocol use. The Client might implement support for IPP Print Policy but authentication could fail, or the Client might have not implemented support for IPP Print Policy.

Duncan is at the office and needs to print a 5 page report that contains color diagrams before his next meeting. His office user account has been granted permission by his office network administrator to print in color. Duncan opens the document on his tablet, taps to print, and selects the desired Printer. The tablet fetches the Printer's default capabilities, and then authenticates using Duncan's user account to retrieve the print options available to him as per his account's print policy, including the option to print in color or monochrome. He prints the document using the color option, retrieves the hardcopy from the printer, and then goes on to his meeting.

Ed is visiting Duncan's office and needs to print a 3 page document. Ed is not listed as a user in the print policy. Ed opens the document on his laptop, clicks to print, and selects the Printer Duncan pointed out to him. The laptop does not support print policies or does but has no valid credentials. The Printer provides Ed's laptop with the default print capabilities. When the Job is submitted to the Printer, the Printer rejects the Job or identifies the setting that were adjusted, since unknown users don't have the right to print in color on this printer.

Figure 3.2 illustrates this use case with a sequence diagram.

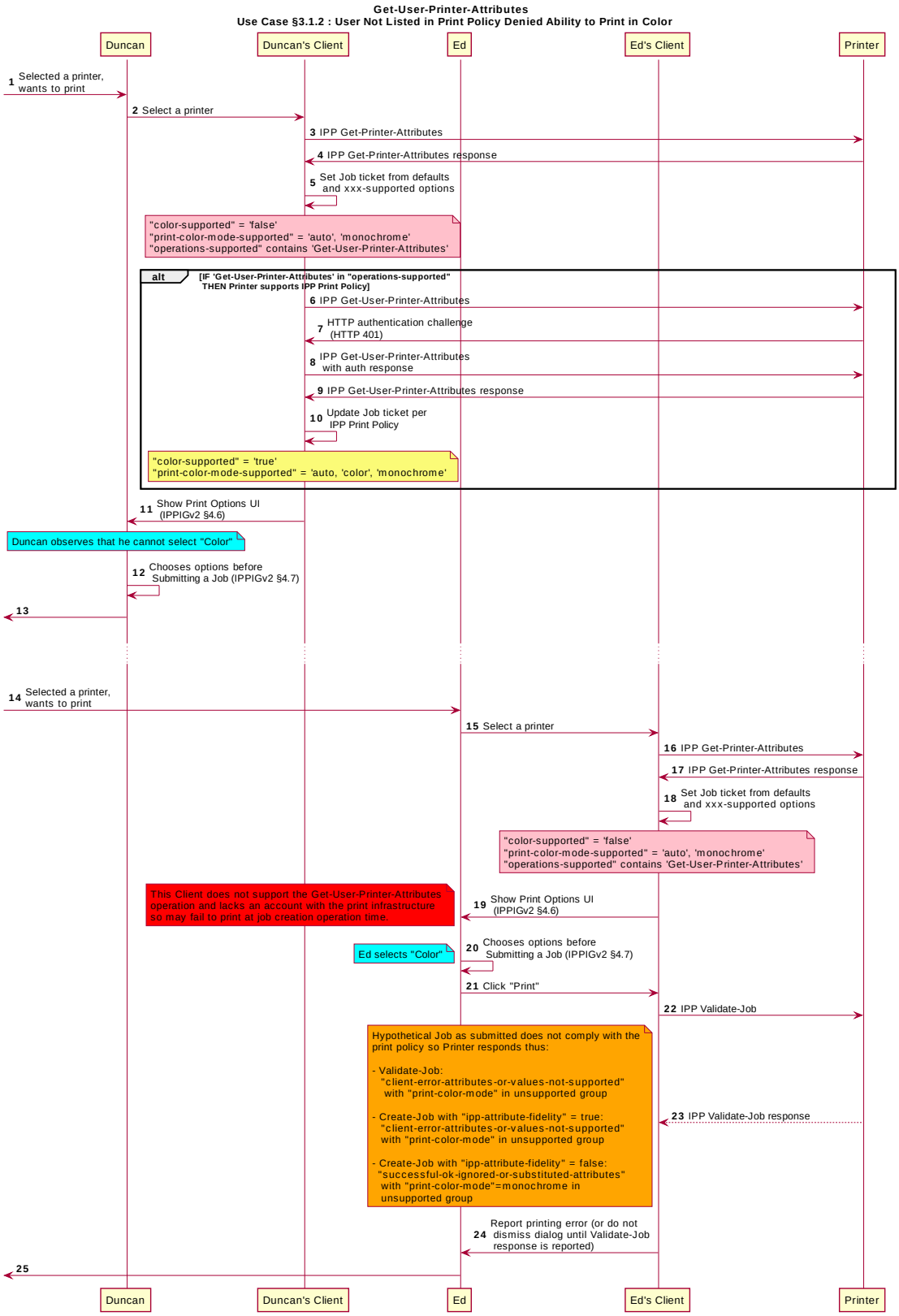

Figure 3.2 : Use Case 3.1.2 Sequence Diagram

3.3 Exceptions

There are no exceptions to the use cases in section 3.2.

3.4 Out of Scope

The following are considered out of scope for this document:

1. Definition of specific print policies.
2. Definition of how print policy management systems structure and/or organize the sets of users and their policies.
3. Definition of non-IPP protocols that can provide similar functionality.

3.5 Design Requirements

The design requirements for this registration are:

1. Define an IPP operation to allow a Client to obtain supported Printer capabilities for a given User.
2. Document interoperability requirements for Clients and Printers.
3. Define security requirements necessary to support the newly defined operations.
4. Define sections to register all attributes, values, and operations with IANA.

The design recommendations for this document are:

1. Recommend suitable authentication methods and guidelines for the use of those methods and provide guidance for Client user interfaces.

4 Get-User-Printer-Attributes Operation

The Get-User-Printer-Attributes operation is semantically analogous to the Get-Printer-Attributes operation [RFC8011] but the response is filtered based on the most authenticated user. The authenticated user (see section 9.3 of [RFC8011]) performing this operation MUST be either a User permitted to create Print Jobs 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.

The Client MUST be prepared to handle an HTTP authentication challenge in response to a Get-User-Printer-Attributes operation request. If the Client initiates the Get-User-Printer-Attributes operation over an HTTP connection without TLS, the Client MUST be prepared to receive an HTTP 426 response to upgrade the connection to TLS [RFC2817][RFC5246]. See [RFC8010] and [RFC8011] for authentication methods that require a secure channel.

A Printer MUST support all the same operation attributes for a Get-User-Printer-Attributes operation that it supports with a Get-Printer-Attributes operation, including those a Client

can use to request a filtered response: “document-format” [RFC8011]; “first-index” [PWG5100.13]; “limit” [PWG5100.13]; and any of the attributes named by “printer-get-attributes-supported” [PWG5100.13].

4.1 Get-User-Printer-Attributes Request

The following groups of attributes are supplied as part of the Get-User-Printer-Attributes request:

Group 1: Operation Attributes

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

As described in [RFC8011] Section 4.1.4.1. The Client MUST supply and the Printer MUST support both of these attributes.

"printer-uri" (uri) :

The Client MUST supply and the Printer MUST support this attribute, which is the target for this operation as described in [RFC8011] Section 4.1.5.

"requesting-user-name" (name(MAX)) :

The Client MUST supply and the Printer MUST support this attribute, as described in [RFC8011] Section 9.3.

“requesting-user-uri” (uri) :

The Client SHOULD supply and the Printer MUST support this attribute, as described in [PWG5100.13] section 5.1.6.

“requesting-user-vcard” (1setOf text(MAX)) :

The Client SHOULD supply and the Printer MUST support this attribute, as described in [PWG5100.SYSTEM] section 7.1.6.

"requested-attributes" (1setOf keyword):

The "requested-attributes" (1setOf keyword) attribute MAY be supplied by the Client and MUST be supported by the Printer as described in [RFC8011] Section 4.2.5.1.

"document-format" (mimeMediaType):

The "document-format" (mimeMediaType) attribute SHOULD be supplied by the Client as described in [RFC8011] Section 4.2.5.1.

4.2 Get-User-Printer-Attributes Response

The Printer returns the following sets of attributes as part of the Get-User-Printer-Attributes response:

Group 1: Operation Attributes

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

As described in [RFC8011] Section 4.1.4.1. The Client MUST supply and the Printer MUST support both of these attributes.

Status Message:

In addition to the REQUIRED status-code returned in every response, the response MAY include a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation attribute as described in [RFC8011] Appendix B and Section 4.1.6.

Group 2: Unsupported Attributes

See [RFC8011] Section 4.1.7 for details on returning unsupported attributes.

Group 3: Printer Attributes

This is the set of requested attributes and their current values. See [RFC8011] Section 4.2.5.2 for details.

5 Conformance Requirements

5.1 Printer Conformance Requirements

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

1. The Get-User-Printer-Attributes operation as defined in section 4.

5.2 Client Conformance Requirements

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

1. The Get-User-Printer-Attributes operation as defined in section 4.

6 Internationalization Considerations

For interoperability and basic support for multiple languages, conforming implementations MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [RFC3629] encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for Network Interchange [RFC5198].

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 in XML and other Markup Languages [UTR20] – XML usage
- Unicode Character Property Model [UTR23] – character properties
- Unicode Conformance Model [UTR33] – Unicode conformance basis

7 Security Considerations

The security considerations for the Get-User-Printer-Attributes operation build upon those defined for IPP/1.1 [RFC8011] and IPP/2.0 [PWG5100.12] for the Validate-Job, Create-Job and Print-Job operations. Additionally, a Printer MUST NOT send a Get-User-Printer-Attributes response over an HTTP connection without TLS [RFC5246] for authentication methods that require a secure channel, as defined in [RFC8010] and [RFC8011].

7.1 Human-readable Strings

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

8 IANA Considerations

8.1 Type2 enum Registrations

The attributes defined in this registration will be published by IANA according to the procedures in IPP Model and Semantics [RFC8011] section 7.1 in the following file:

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

The registry entries will contain the following information:

```
Attributes (attribute syntax)
   Enum Value      Enum Symbolic Name                      Reference
   ----------      ------------------                      ---------
operations-supported (1setOf type2 enum)                   [RFC8011]
     0x0066          Get-User-Printer-Attributes           [IPPGUPA]
```

8.2 Operation Registrations

The operations defined in this registration will be published by IANA according to the procedures in IPP/1.1 Model and Semantics [RFC8011] section 7.4 in the following file:

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

The registry entries will contain the following information:

```
   Operation Name                                          Reference
   --------------                                          ---------
   Get-User-Printer-Attributes                             [IPPGUPA]
```

9 References

9.1 Normative References

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[UAX15] Unicode Consortium, “Normalization Forms”, UAX#15, February 2016, http://www.unicode.org/reports/tr15

[UAX29] Unicode Consortium, “Unicode Text Segmentation”, UAX#29, June 2016, http://www.unicode.org/reports/tr29

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