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**Applicability of RFC 2231 Encoding to  
Hypertext Transfer Protocol (HTTP) Headers  
draft-reschke-rfc2231-in-http-00**

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**Abstract**

By default, message header parameters in Hypertext Transfer Protocol (HTTP) messages can not carry characters outside the ISO-8859-1 character set. RFC 2231 defines an escaping mechanism for use in Multipurpose Internet Mail Extensions (MIME) headers. This document specifies a profile of that encoding suitable for use in HTTP.

**Editorial Note (To be removed by RFC Editor before publication)**

There are multiple HTTP headers that already use RFC 2231 encoding in practice (Content-Disposition) or might use it in the future (Link). The purpose of this document is to provide a single place where the generic aspects of RFC 2231 encoding in HTTP headers are defined.

Distribution of this document is unlimited. Although this is not a work item of the HTTPbis Working Group, comments should be sent to

the Hypertext Transfer Protocol (HTTP) mailing list at [ietf-http-wg@w3.org](mailto:ietf-http-wg@w3.org), which may be joined by sending a message with subject "subscribe" to [ietf-http-wg-request@w3.org](mailto:ietf-http-wg-request@w3.org).

Discussions of the HTTPbis Working Group are archived at <http://lists.w3.org/Archives/Public/ietf-http-wg/>.

XML versions, latest edits and the issues list for this document are available from <http://greenbytes.de/tech/webdav/#draft-reschke-rfc2231-in-http>.

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## 1. Introduction

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By default, message header parameters in HTTP ([\[RFC2616\]](#) ([Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.](#))) messages can not carry characters outside the ISO-8859-1 character set ([\[ISO-8859-1\]](#) ([International Organization for Standardization, "Information technology -- 8-bit single-byte coded graphic character sets -- Part 1: Latin alphabet No. 1," 1998.](#))). RFC 2231 ([\[RFC2231\]](#) ([Freed, N. and K. Moore, "MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations," November 1997.](#))) defines an escaping mechanism for use in MIME headers. This document specifies a profile of that encoding for use in HTTP.

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## 2. Notational Conventions

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The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\] \(Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.\)](#).

This specification uses the augmented BNF notation defined in Section 2.1 of [\[RFC2616\] \(Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.\)](#), including its rules for linear whitespace (LWS). [\[LWS\] \(This needs to be checked.\)](#)

Non-ASCII characters used in prose for examples are encoded using the format "Backslash-U with Delimiters", defined in Section 5.1 of [\[RFC5137\] \(Klensin, J., "ASCII Escaping of Unicode Characters," February 2008.\)](#).

Note that this specification uses the term "character set" for consistency with other IETF specifications such as RFC 2277 (see [\[RFC2277\] \(Alvestrand, H., "IETF Policy on Character Sets and Languages," January 1998.\)](#), Section 3). A more accurate term would be "character encoding" (a mapping of code points to octet sequences).

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## 3. A Profile of RFC 2231 for Use in HTTP

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RFC 2231 defines several extensions to MIME. The sections below discuss if and how they apply to HTTP.

In short:

- \*Parameter Continuations aren't needed ([Section 3.1 \(Parameter Continuations\)](#)),
- \*Character Set and Language Information are useful, therefore a simple subset is specified ([Section 3.2 \(Parameter Value Character Set and Language Information\)](#)), and
- \*Language Specifications in Encoded Words aren't needed ([Section 3.3 \(Language specification in Encoded Words\)](#)).

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### 3.1. Parameter Continuations

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Section 3 of [\[RFC2231\] \(Freed, N. and K. Moore, "MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations," November 1997.\)](#) defines a mechanism that deals with the length limitations that

apply to MIME headers. These limitations do not apply to HTTP ([\[RFC2616\] \(Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.\)](#), Section 19.4.7).

Thus in HTTP, senders MUST NOT use parameter continuations, and therefore recipients do not need to support them.

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### 3.2. Parameter Value Character Set and Language Information

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Section 4 of [\[RFC2231\] \(Freed, N. and K. Moore, "MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations," November 1997.\)](#) specifies how to embed language information into parameter values, and also how to encode non-ASCII characters, dealing with restrictions both in MIME and HTTP header parameters.

However, RFC 2231 does not specify mandatory-to-implement character encoding, making it hard for senders to decide which character set to use. Thus, recipients implementing this specification MUST support the character sets "ISO-8859-1" [\[ISO-8859-1\] \(International Organization for Standardization, "Information technology -- 8-bit single-byte coded graphic character sets -- Part 1: Latin alphabet No. 1," 1998.\)](#) and "UTF-8" [\[RFC3629\] \(Yergeau, F., "UTF-8, a transformation format of ISO 10646," November 2003.\)](#).

Furthermore, RFC 2231 allows leaving out the character encoding information. The profile defined by this specification does not allow that.

The syntax for parameters is defined in Section 3.6 of [\[RFC2616\] \(Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.\)](#):

```
parameter      = attribute "=" value

attribute      = token
value          = token | quoted-string

quoted-string  = <quoted-string, defined in [RFC2616], Section 2.2>
token          = <token, defined in [RFC2616], Section 2.2>
```

This specification extends the grammar to:

```

parameter      = reg-parameter | ext-parameter

reg-parameter  = attribute "=" value
ext-parameter  = attribute "*"=" ext-value

ext-value      = charset "'" [ language ] "'" value-chars

charset        = "UTF-8" | "ISO-8859-1" | ext-charset
                ; NOTE: case-insensitive

ext-charset    = token ; see IANA charset registry
                ; (<http://www.iana.org/assignments/character-sets>)

language       = <Language-Tag, defined in [RFC4646], Section 2.1>

value-chars    = *( pct-encoded | attr-char )

pct-encoded    = "%" HEXDIG HEXDIG

attr-char      = ALPHA | DIGIT
                | "-" | "." | "_" | "~" | ":"
                | "!" | "$" | "&" | "+"

ALPHA          = %x41-5A | %x61-7A
                ; A-Z | a-z
DIGIT          = %x30-39
                ; any US-ASCII digit "0".."9"
HEXDIG         = DIGIT | "A" | "B" | "C" | "D" | "E" | "F"
                ; NOTE: case-insensitive

```

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### 3.2.1. Examples

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Non-extended notation, using "token":

```
foo: bar; title=Economy
```

Non-extended notation, using "quoted-string":

```
foo: bar; title="US-$ rates"
```

Extended notation, using the unicode character \u'00A3' (POUND SIGN):

```
foo: bar; title*=iso-8859-1'en'%A3%20rates
```

Note: the Unicode pound sign character \u'00A3' was encoded using ISO-8859-1 into the single octet A3, then percent-encoded. Also note

that the space character was encoded as %20, as attr-char does not contain it.

Extended notation, using the unicode characters \u'00A3' (POUND SIGN) and \u'20AC' (EURO SIGN):

```
foo: bar; title*=UTF-8''%c2%a3%20and%20%e2%82%ac%20rates
```

Note: the unicode pound sign character \u'00A3' was encoded using UTF-8 into the octet sequence C2 A3, then percent-encoded. Likewise, the unicode euro sign character \u'20AC' was encoded into the octet sequence E2 82 AC, then percent-encoded. Also note that HEXDIG allows both lower-case and upper-case character, so recipients must understand both, and that the language information is optional, while the character set is not.

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### 3.3. Language specification in Encoded Words

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Section 5 of [\[RFC2231\] \(Freed, N. and K. Moore, "MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations," November 1997.\)](#) extends the encoding defined in [\[RFC2047\] \(Moore, K., "MIME \(Multipurpose Internet Mail Extensions\) Part Three: Message Header Extensions for Non-ASCII Text," November 1996.\)](#) to also support language specification in encoded words. Although the HTTP/1.1 does refer to RFC 2047 ([\[RFC2616\] \(Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1," June 1999.\)](#), Section 2.2), it's not clear to which header field exactly it applies, and whether it is implemented in practice (see <http://tools.ietf.org/wg/httpbis/trac/ticket/111> for details).

Thus, the RFC 2231 profile defined by this specification does not include this feature.

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## 4. Guidelines for Usage in HTTP Header Definitions

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Specifications of HTTP headers that use the extensions defined in [Section 3.2 \(Parameter Value Character Set and Language Information\)](#) should clearly state that. The best way to achieve this is to normatively reference this specification, and to include the [ext-parameter](#) production into the ABNF for that header.

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#### 4.1. When to Use the Extension

Section 4.2 of [\[RFC2277\] \(Alvestrand, H., "IETF Policy on Character Sets and Languages," January 1998.\)](#) requires that protocol elements containing text can carry language information. Thus, the [ext-parameter](#) production should always be used when the parameter value is of textual nature.

Furthermore, the extension should also be used whenever the parameter value needs to carry characters not present in the US-ASCII ([\[USASCII\] \(American National Standards Institute, "Coded Character Set -- 7-bit American Standard Code for Information Interchange," 1986.\)](#)) character set (note that it would be unacceptable to define a new header that would be restricted to a subset of the Unicode character set).

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#### 4.2. Error Handling

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Header specifications that include parameters should also specify whether same-named parameters can occur multiple times. If repetitions are not allowed (and this is believed to be the common case), the specification should state whether regular or the extended syntax takes precedence. In the latter case, this could be used by senders to use both formats without breaking recipients that do not understand the syntax.

Example:

```
foo: bar; title="EURO exchange rates";
      title*=utf-8''%e2%82%ac%20exchange%20rates
```

In this case, the sender provides an ASCII version of the title for legacy recipient, but also includes an internationalized version for recipients understanding this specification -- the latter obviously should prefer the new syntax over the old one.

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#### 5. Security Considerations

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This document does not discuss security issues and is not believed to raise any security issues not already endemic in HTTP.

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#### 6. IANA Considerations

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There are no IANA Considerations related to this specification.

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## 7. Acknowledgements

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Thanks to Frank Ellermann for help figuring out BNF details.

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## 8. References

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### 8.1. Normative References

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[ISO-8859-1]	International Organization for Standardization, "Information technology -- 8-bit single-byte coded graphic character sets -- Part 1: Latin alphabet No. 1," ISO/IEC 8859-1:1998, 1998.
[RFC2119]	<a href="#">Bradner, S.</a> , " <a href="#">Key words for use in RFCs to Indicate Requirement Levels</a> ," BCP 14, RFC 2119, March 1997.
[RFC2231]	<a href="#">Freed, N.</a> and <a href="#">K. Moore</a> , " <a href="#">MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations</a> ," RFC 2231, November 1997.
[RFC2616]	<a href="#">Fielding, R.</a> , <a href="#">Gettys, J.</a> , <a href="#">Mogul, J.</a> , <a href="#">Frystyk, H.</a> , <a href="#">Masinter, L.</a> , <a href="#">Leach, P.</a> , and <a href="#">T. Berners-Lee</a> , " <a href="#">Hypertext Transfer Protocol -- HTTP/1.1</a> ," RFC 2616, June 1999.
[RFC3629]	<a href="#">Yergeau, F.</a> , " <a href="#">UTF-8, a transformation format of ISO 10646</a> ," RFC 3629, STD 63, November 2003.
[RFC4646]	<a href="#">Phillips, A.</a> and <a href="#">M. Davis</a> , " <a href="#">Tags for Identifying Languages</a> ," BCP 47, RFC 4646, September 2006.

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### 8.2. Informative References

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[RFC2047]	<a href="#">Moore, K.</a> , " <a href="#">MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text</a> ," RFC 2047, November 1996.
[RFC2277]	<a href="#">Alvestrand, H.</a> , " <a href="#">IETF Policy on Character Sets and Languages</a> ," BCP 18, RFC 2277, January 1998.
[RFC5137]	<a href="#">Klensin, J.</a> , " <a href="#">ASCII Escaping of Unicode Characters</a> ," BCP 137, RFC 5137, February 2008.
[USASCII]	American National Standards Institute, "Coded Character Set -- 7-bit American Standard Code for Information Interchange," ANSI X3.4, 1986.

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