        **Indicating Character Encoding and Language for HTTP Header Field
                              Parameters**
                      draft-reschke-rfc5987bis-04

Abstract

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

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

   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 [1], which may be joined by sending a message
   with subject "subscribe" to ietf-http-wg-request@w3.org [2].

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

   XML versions, latest edits, diffs, and the issues list for this
   document are available from
   <http://greenbytes.de/tech/webdav/#draft-reschke-rfc5987bis>. A
   collection of test cases is available at
   <http://greenbytes.de/tech/tc2231/>.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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time. It is inappropriate to use Internet-Drafts as reference
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This Internet-Draft will expire on June 20, 2012.

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Table of Contents

1. Introduction

By default, message header field parameters in HTTP ([RFC2616])
messages cannot carry characters outside the ISO-8859-1 coded
character set ([ISO-8859-1]). RFC 2231 ([RFC2231]) defines an
encoding mechanism for use in MIME headers. This document specifies
an encoding suitable for use in HTTP header fields that is compatible
with a profile of the encoding defined in RFC 2231.

This document obsoletes [RFC5987] and moves it to "historic" status;
the changes are summarized in Appendix A.

   Note: in the remainder of this document, RFC 2231 is only
   referenced for the purpose of explaining the choice of features
   that were adopted; they are therefore purely informative.

   Note: this encoding does not apply to message payloads transmitted
   over HTTP, such as when using the media type "multipart/form-data"
   ([RFC2388]).

2. Notational Conventions

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].

This specification uses the ABNF (Augmented Backus-Naur Form)
notation defined in [RFC5234]. The following core rules are included
by reference, as defined in [RFC5234], Appendix B.1: ALPHA (letters),
DIGIT (decimal 0-9), HEXDIG (hexadecimal 0-9/A-F/a-f), and LWSP
(linear whitespace).

This specification uses terminology defined in [RFC6365], namely:
"character encoding scheme" (below abbreviated to "character
encoding"), "charset" and "coded character set".

Note that this differs from RFC 2231, which uses the term "character
set" for "character encoding scheme".

3. Comparison to RFC 2231 and Definition of the Encoding

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

In short:

o Parameter Continuations aren't needed (Section 3.1),

   o Character Encoding and Language Information are useful, therefore
      a simple subset is specified (Section 3.2), and

   o Language Specifications in Encoded Words aren't needed
      (Section 3.3).

3.1. Parameter Continuations

   Section 3 of [RFC2231] defines a mechanism that deals with the length
   limitations that apply to MIME headers. These limitations do not
   apply to HTTP ([RFC2616], Section 19.4.7).

   Thus, parameter continuations are not part of the encoding defined by
   this specification.

3.2. Parameter Value Character Encoding and Language Information

   Section 4 of [RFC2231] 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 field
   parameters.

   However, RFC 2231 does not specify a mandatory-to-implement character
   encoding, making it hard for senders to decide which encoding to use.
   Thus, recipients implementing this specification MUST support the
   "UTF-8" character encoding [RFC3629].

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

3.2.1. Definition

   The syntax for parameters is defined in Section 3.6 of [RFC2616]
   (with RFC 2616 implied LWS translated to RFC 5234 LWSP):

     parameter   = attribute LWSP "=" LWSP 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>

   In order to include character encoding and language information, this
   specification modifies the RFC 2616 grammar to be:

```
     parameter     = reg-parameter / ext-parameter

     reg-parameter = parmname LWSP "=" LWSP value

     ext-parameter = parmname "*" LWSP "=" LWSP ext-value

     parmname      = 1*attr-char

     ext-value     = charset  "'" [ language ] "'" value-chars
                   ; like RFC 2231's <extended-initial-value>
                   ; (see [RFC2231], Section 7)

     charset       = "UTF-8" / mime-charset

     mime-charset  = 1*mime-charsetc
     mime-charsetc = ALPHA / DIGIT
                   / "!" / "#" / "$" / "%" / "&"
                   / "+" / "-" / "^" / "_" / "`"
                   / "{" / "}" / "~"
                   ; as <mime-charset> in Section 2.3 of [RFC2978]
                   ; except that the single quote is not included
                   ; SHOULD be registered in the IANA charset registry

     language      = <Language-Tag, defined in [RFC5646], Section 2.1>

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

     pct-encoded   = "%" HEXDIG HEXDIG
                   ; see [RFC3986], Section 2.1

     attr-char     = ALPHA / DIGIT
                   / "!" / "#" / "$" / "&" / "+" / "-" / "."
                   / "^" / "_" / "`" / "|" / "~"
                   ; token except ( "*" / "'" / "%" )
```

Thus, a parameter is either a regular parameter (reg-parameter), as
previously defined in Section 3.6 of [RFC2616], or an extended
parameter (ext-parameter).

Extended parameters are those where the left-hand side of the
assignment ends with an asterisk character.

The value part of an extended parameter (ext-value) is a token that
consists of three parts: the REQUIRED character encoding name
(charset), the OPTIONAL language information (language), and a
character sequence representing the actual value (value-chars),
separated by single quote characters. Note that both character
encoding names and language tags are restricted to the US-ASCII coded

character set, and are matched case-insensitively (see [RFC2978], Section 2.3 and [RFC5646], Section 2.1.1).

Inside the value part, characters not contained in attr-char are encoded into an octet sequence using the specified character encoding. That octet sequence is then percent-encoded as specified in Section 2.1 of [RFC3986].

Producers MUST use the "UTF-8" ([RFC3629]) character encoding. Extension character encodings (mime-charset) are reserved for future use.

   Note: recipients should be prepared to handle encoding errors, such as malformed or incomplete percent escape sequences, or non-decodable octet sequences, in a robust manner. This specification does not mandate any specific behavior, for instance, the following strategies are all acceptable:

   * ignoring the parameter,

   * stripping a non-decodable octet sequence,

   * substituting a non-decodable octet sequence by a replacement character, such as the Unicode character U+FFFD (Replacement Character).

3.2.2. Historical Notes

The RFC 2616 token production ([RFC2616], Section 2.2) differs from the production used in RFC 2231 (imported from Section 5.1 of [RFC2045]) in that curly braces ("{" and "}") are excluded. Thus, these two characters are excluded from the attr-char production as well.

The <mime-charset> ABNF defined here differs from the one in Section 2.3 of [RFC2978] in that it does not allow the single quote character (see also RFC Errata ID 1912 [Err1912]). In practice, no character encoding names using that character have been registered at the time of this writing.

For backwards compatibility with RFC 2231, the encoding defined by this specification deviates from common parameter syntax in that the quoted-string notation is not allowed. Implementations using generic parser components might not be able to detect the use of quoted-string notation and thus might accept that format, although invalid, as well.

[RFC5987] did require support for ISO-8859-1, too; for compatibility

with legacy code, recipients are encouraged to support this encoding
as well.

3.2.3. Examples

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*=utf-8'en'%C2%A3%20rates

Note: the Unicode pound sign character U+00A3 was encoded into the
octet sequence C2 A3 using the UTF-8 character encoding, then
percent-encoded. Also, note that the space character was encoded as
%20, as it is not contained in attr-char.

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 into the
octet sequence C2 A3 using the UTF-8 character encoding, 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 lowercase and uppercase characters,
so recipients must understand both, and that the language information
is optional, while the character encoding is not.

3.3. Language Specification in Encoded Words

Section 5 of [RFC2231] extends the encoding defined in [RFC2047] to
also support language specification in encoded words. Although the
HTTP/1.1 specification does refer to RFC 2047 ([RFC2616], 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, this specification does not include this feature.

4. Guidelines for Usage in HTTP Header Field Definitions

   Specifications of HTTP header fields that use the extensions defined
   in Section 3.2 ought to clearly state that. A simple way to achieve
   this is to normatively reference this specification, and to include
   the ext-value production into the ABNF for that header field.

   For instance:

     foo-header = "foo" LWSP ":" LWSP token ";" LWSP title-param
     title-param = "title" LWSP "=" LWSP value
                 / "title*" LWSP "=" LWSP ext-value
     ext-value   = <see RFC 5987, Section 3.2>

      Note: The Parameter Value Continuation feature defined in Section
      3 of [RFC2231] makes it impossible to have multiple instances of
      extended parameters with identical parmname components, as the
      processing of continuations would become ambiguous. Thus,
      specifications using this extension are advised to disallow this
      case for compatibility with RFC 2231.

      Note: This specification does not automatically assign a new
      interpretration to parameter names ending in an asterisk. As
      pointed out above, it's up to the specification for the non-
      extended parameter to "opt in" to the syntax defined here. That
      being said, some existing implementations are known to
      automatically switch to the use of this notation when a parameter
      name ends with an asterisk, thus using parameter names ending in
      an asterisk for something else is likely to cause interoperability
      problems.

4.1. When to Use the Extension

   Section 4.2 of [RFC2277] requires that protocol elements containing
   human-readable text are able to carry language information. Thus,
   the ext-value production ought to be always used when the parameter
   value is of textual nature and its language is known.

   Furthermore, the extension ought to also be used whenever the
   parameter value needs to carry characters not present in the US-ASCII
   ([USASCII]) coded character set (note that it would be unacceptable
   to define a new parameter that would be restricted to a subset of the
   Unicode character set).

4.2. Error Handling

   Header field specifications need to define whether multiple instances
   of parameters with identical parmname components are allowed, and how

they should be processed. This specification suggests that a
parameter using the extended syntax takes precedence. This would
allow producers to use both formats without breaking recipients that
do not understand the extended syntax yet.

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 recipients, but also includes an internationalized version for
recipients understanding this specification -- the latter obviously
ought to prefer the new syntax over the old one.

   Note: at the time of this writing, many implementations failed to
   ignore the form they do not understand, or prioritize the ASCII
   form although the extended syntax was present.

5. Security Considerations

The format described in this document makes it possible to transport
non-ASCII characters, and thus enables character "spoofing"
scenarios, in which a displayed value appears to be something other
than it is.

Furthermore, there are known attack scenarios relating to decoding
UTF-8.

See Section 10 of [RFC3629] for more information on both topics.

In addition, the extension specified in this document makes it
possible to transport multiple language variants for a single
parameter, and such use might allow spoofing attacks, where different
language versions of the same parameter are not equivalent. Whether
this attack is useful as an attack depends on the parameter
specified.

6. Acknowledgements

Thanks to Martin Duerst and Frank Ellermann for help figuring out
ABNF details, to Graham Klyne and Alexey Melnikov for general review,
to Chris Newman for pointing out an RFC 2231 incompatibility, and to
Benjamin Carlyle, Roar Lauritzsen, Eric Lawrence, and James Manger
for implementer's feedback.

7. References

7.1. Normative References

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             Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2616]   Fielding, R., Gettys, J., Mogul, J., Frystyk, H.,
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[RFC2978]   Freed, N. and J. Postel, "IANA Charset Registration
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[RFC3629]   Yergeau, F., "UTF-8, a transformation format of ISO
             10646", STD 63, RFC 3629, November 2003.

[RFC3986]   Berners-Lee, T., Fielding, R., and L. Masinter,
             "Uniform Resource Identifier (URI): Generic Syntax",
             STD 66, RFC 3986, January 2005.

[RFC5234]   Crocker, D., Ed. and P. Overell, "Augmented BNF for
             Syntax Specifications: ABNF", STD 68, RFC 5234,
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[RFC5646]   Phillips, A., Ed. and M. Davis, Ed., "Tags for
             Identifying Languages", BCP 47, RFC 5646,
             September 2009.

[USASCII]   American National Standards Institute, "Coded Character
             Set -- 7-bit American Standard Code for Information
             Interchange", ANSI X3.4, 1986.

7.2. Informative References

[Err1912]   RFC Errata, "Errata ID 1912, RFC 2978",
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[ISO-8859-1] International Organization for Standardization,
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[RFC2045]   Freed, N. and N. Borenstein, "Multipurpose Internet
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             Message Bodies", RFC 2045, November 1996.

[RFC2047]   Moore, K., "MIME (Multipurpose Internet Mail
             Extensions) Part Three: Message Header Extensions for
             Non-ASCII Text", RFC 2047, November 1996.

   [RFC2231]   Freed, N. and K. Moore, "MIME Parameter Value and
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                  Continuations", RFC 2231, November 1997.

   [RFC2277]   Alvestrand, H., "IETF Policy on Character Sets and
                  Languages", BCP 18, RFC 2277, January 1998.

   [RFC2388]   Masinter, L., "Returning Values from Forms: multipart/
                  form-data", RFC 2388, August 1998.

   [RFC5987]   Reschke, J., "Character Set and Language Encoding for
                  Hypertext Transfer Protocol (HTTP) Header Field
                  Parameters", RFC 5987, August 2010.

   [RFC5988]   Nottingham, M., "Web Linking", RFC 5988, October 2010.

   [RFC6266]   Reschke, J., "Use of the Content-Disposition Header
                  Field in the Hypertext Transfer Protocol (HTTP)",
                  RFC 6266, June 2011.

   [RFC6365]   Hoffman, P. and J. Klensin, "Terminology Used in
                  Internationalization in the IETF", BCP 166, RFC 6365,
                  September 2011.

URIs

   [1] <mailto:ietf-http-wg@w3.org>

   [2] <mailto:ietf-http-wg-request@w3.org?subject=subscribe>

Appendix A. Changes from RFC 5987

   This section summarizes the changes compared to [RFC5987]:

   o The document title was changed to "Indicating Character Encoding
      and Language for HTTP Header Field Parameters".

   o The requirement to support the "ISO-8859-1" encoding was removed.

Appendix B. Implementation Report

   The encoding defined in this document currently is used for two
   different HTTP header fields:

   o "Content-Disposition", defined in [RFC6266], and

   o "Link", defined in [RFC5988].

As the encoding is a profile/clarification of the one defined in
[RFC2231] in 1997, many user agents already supported it for use in
"Content-Disposition" when [RFC5987] got published.

Since the publication of [RFC5987], two more popular desktop user
agents have added support for this encoding; see <http://purl.org/
NET/http/content-disposition-tests#encoding-2231-char> for details.
At this time, only one major desktop user agent (Safari) does not
support it.

Note that the implementation in Internet Explorer 9 does not support
the ISO-8859-1 character encoding; this document revision
acknowledges that UTF-8 is sufficient for expressing all code points,
and removes the requirement to support ISO-8859-1.

The "Link" header field, on the other hand, was only recently
specified in [RFC5988]. At the time of this writing, no User Agent
supported the "title*" parameter, using the encoding defined by this
document, but implementation for Firefox was already in progress (see
<https://bugzilla.mozilla.org/show_bug.cgi?id=663057>).

Appendix C. Change Log (to be removed by RFC Editor before publication)

C.1. Since RFC5987

Only editorial changes for the purpose of starting the revision
process (obs5987).

C.2. Since draft-reschke-rfc5987bis-00

Resolved issues "iso-8859-1" and "title" (title simplified). Added
and resolved issue "historic5987".

C.3. Since draft-reschke-rfc5987bis-01

Added issues "httpbis", "parmsyntax", "terminology" and
"valuesyntax". Closed issue "impls".

C.4. Since draft-reschke-rfc5987bis-02

Resolved issue "terminology".

C.5. Since draft-reschke-rfc5987bis-03

In Section 3.2, pull historical notes into a separate subsection.
Resolved issues "valuesyntax" and "parmsyntax".

Appendix D. Resolved issues (to be removed by RFC Editor before
             publication)

   Issues that were either rejected or resolved in this version of this
   document.

D.1. parmsyntax

   Type: edit

   <http://lists.w3.org/Archives/Public/ietf-http-wg/2011OctDec/
   0159.html>

   James.H.Manger@team.telstra.com (2011-11-02): Noted by James Manger:
   "Presumably RFC5987 (or its predecessors) decided it was highly
   unlikely that any parameter names in use ended in "*" (though they
   are valid) so it could redefine the syntax of values for such names."
   - add a note that the notation indeed overloads parameter name syntax
   and clarify the use.

   Resolution (2011-12-18): Note that this spec doesn't mandate special
   handling of parameters ending in "*", but also point out that some
   implemenations assume this, so trailing asterisks should be avoided
   when not used for this encoding.

D.2. valuesyntax

   Type: edit

   <http://lists.w3.org/Archives/Public/ietf-http-wg/2011OctDec/
   0159.html>

   James.H.Manger@team.telstra.com (2011-11-02): Noted by James Manger:
   "Curiously, RFC5987 disobeys the proposed recommendations for new
   parameters. It allows foo*=UTF-8''coll%C3%A8gues but not foo*="UTF-
   8''coll%C3%A8gues" That might be ok with a parser that understands
   token, quoted-string, and RFC5987, but presumably it will cause
   problems when RFC5987 processing is done after a "standard httpbis
   parser" handles the token | quoted-string step. " - add a note
   clarifying that this is indeed a shortcoming of the format, and what
   it means for implementations.

   Resolution (2011-12-18): Added a note describing the problem.

Appendix E. Open issues (to be removed by RFC Editor prior to
             publication)

E.1. edit

Type: edit

julian.reschke@greenbytes.de (2011-04-15): Umbrella issue for
editorial fixes/enhancements.

E.2. httpbis

Type: edit

julian.reschke@greenbytes.de (2011-09-17): The document refers
normatively to RFC 2616. Should it continue to do so, or should we
wait for HTTPbis? This may affect edge case in the ABNF, such as the
definition of linear white space or the characters allowed in
"token".

Author's Address

Julian F. Reschke
greenbytes GmbH
Hafenweg 16
Muenster, NW 48155
Germany

EMail: julian.reschke@greenbytes.de
URI: http://greenbytes.de/tech/webdav/