Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: December 6, 2015

J. Reschke
greenbytes
S. Loreto
Ericsson
June 4, 2015

'Out-Of-Band' Content Coding for HTTP
draft-reschke-http-oob-encoding-00

Abstract

This document describes an Hypertext Transfer Protocol (HTTP) content coding that can be used to describe the location of a secondary resource that contans the payload.

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, and issue tracking for this document are available from <https://github.com/reschke/oobencoding> and <http://greenbytes.de/tech/webdav/#draft-reschke-http-oob-encoding>.

Status of This Memo

Table of Contents

1. Introduction

This document describes an Hypertext Transfer Protocol (HTTP) content coding (Section 3.1.2.1 of [RFC7231]) that can be used to describe the location of a secondary resource that contans the payload.

The primary use case for this content coding is to enable origin servers to delegate the delivery of content to a secondary server that might be "closer" to the client (with respect to network topology) and/or able to cache content, leveraging content encrytion, as described in [ENCRYPTENC].

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 document reuses terminology used in the base HTTP specifications, namely Section 2 of [RFC7230] and Section 3 of [RFC7231].

3. 'Out-Of-Band' Content Coding

3.1. Overview

The 'Out-Of-Band' content coding is used to direct the recipient to retrieve the actual message representation (Section 3 of [RFC7231]) from a secondary resource, such as a public cache:

1. Client performs GET request

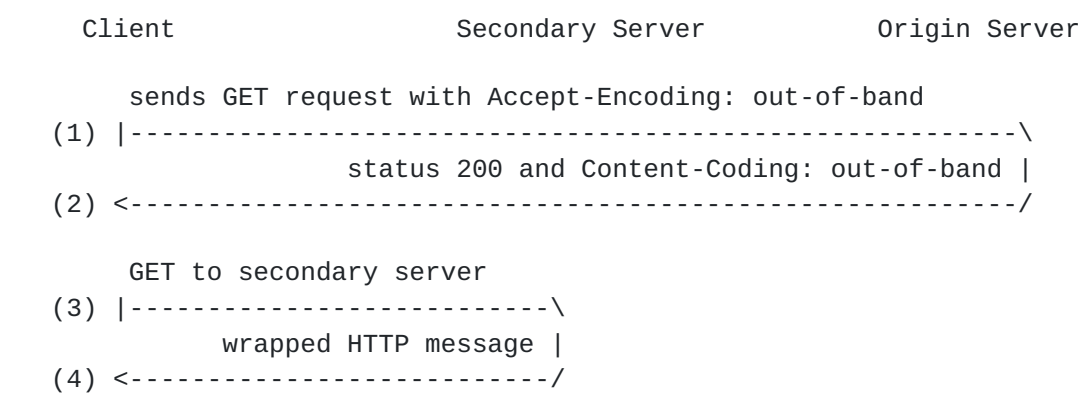
2. Received response specifies the 'out-of-band' content coding; the payload of the response contains additional meta data, plus the location of the secondary resource

3. Client performs GET request on secondary resource (usually again via HTTP(s))

4. Secondary server provides wrapped HTTP message

5. Client unwraps that representation (obtaining a full HTTP message)

6. Client combines above representation with additional representation metadata obtained from the primary resource



3.2. Definitions

The name of the content coding is "out-of-band".

The payload format uses JavaScript Object Notation (JSON, [RFC7159]), describing an array of objects describing secondary resources, each containing some of the members below:

'URI' A REQUIRED string containing the URI reference (Section 4.1 of [RFC3986]) of the secondary resource.

'metadata' An OPTIONAL object containing additional members, representing header field values to be recombined with the metadata from the secondary resource and which can not appear as header fields in the response message itself (header fields that occur multiple times need to be combined into a single field value as per Section 3.2.2 of [RFC7230]; header field names are lower-cased).

The payload format uses a JSON array so that the origin server can specify multiple secondary resources. When a client receives a response containing multiple entries, it is free to choose which of these to use.

The representation of the secondary resource needs to use a media type capable of representing a full HTTP message. For now the only supported type is "application/http" (Section 8.3.2 of [RFC7230]).

The client then obtains the original message by:

1. Unwrap the encapsulated HTTP message by removing any transfer and content codings.

   The latter might require additional metadata that could be present in the "metadata" object, such as the "Encryption-Key" header field described in Section 4 of [ENCRYPTENC].

2. Replacing/setting any response header fields from the primary response except for framing-related information such as Content-Length, Transfer-Encoding and Content-Encoding.

3. Replacing/setting any header fields with those present as members in the "metadata" object. [[anchor3: Do we have a use case for this?]]

Note that although this mechanism causes the inclusion of external content, it will not affect the application-level security properties of the reconstructed message, such as its web origin ([RFC6454]).

The cacheability of the response for the secondary resource does not affect the cacheability of the reconstructed response message, which is the same as for the origin server's response.

3.3. Examples

3.3.1. Basic Example

Client request of primary resource:

```
GET /test HTTP/1.1
Host: www.example.com
Accept-Encoding: gzip, out-of-band
```

Response:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:00 GMT
Content-Type: text/plain
Cache-Control: max-age=10, public
Content-Encoding: out-of-band
Content-Length: 76

[{
  "URI": "http://example.net/bae27c36-fa6a-11e4-ae5d-00059a3c7a00"
}]
```

(note that the Content-Type header field describes the media type of the secondary's resource representation)

Client request for secondary resource:

```
GET /bae27c36-fa6a-11e4-ae5d-00059a3c7a00 HTTP/1.1
Host: example.net
```

Response:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:10 GMT
Content-Type: application/http
Cache-Control: private
Content-Length: 115

HTTP/1.1 200 OK
Date: Thu, 14 May 2015 17:00:00 GMT
Content-Length: 15
Content-Language: en

Hello, world.
```

Final message after recombining header fields:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:00 GMT
Content-Length: 15
Cache-Control: max-age=10, public
Content-Type: text/plain
Content-Language: en

Hello, world.
```

In this example, Cache-Control, Content-Length, and Date have been set/overwritten with data from the primary resource's representation.

3.3.2. Example involving an encryted resource

Given the example HTTP message from Section 5.4 of [ENCRYPTENC], a primary resource could use the "out-of-band" encoding to specify just the location of the secondary resource plus the contents of the "Encryption-Key" header field needed to decrypt the payload:

Response:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:00 GMT
Content-Encoding: out-of-band
Content-Type: text/plain
Content-Length: 192

[{
  "URI": "http://example.net/bae27c36-fa6a-11e4-ae5d-00059a3c7a00"
  "metadata": {
    "encryption-key": "keyid=\"a1\";
                      key=\"9Z57YCb3dK95dSsdFJbkag\""
  }
}]
```

(note that the Content-Type header field describes the media type of the secondary's resource representation)

Response for secondary resource:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:10 GMT
Content-Type: application/http
Content-Length: ...
Cache-Control: private

HTTP/1.1 200 OK
Content-Length: 31
Content-Encoding: aesgcm-128
Encryption: keyid="a1"; salt="ibZx1RNz537h1XNkRcPpjA"

zK3kpG__Z8whjIkG6RYgPz11oUkTKcxPy9WP-VPMfuc
```

(payload body shown in base64 here)

Final message after recombining header fields:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:00 GMT
Content-Length: 15
Content-Type: text/plain

I am the walrus
```

4. Feature Discovery

New content codings can be deployed easily, as the client can use the "Accept-Encoding" header field (Section 5.3.4 of [RFC7231]) to signal which content codings are supported.

5. Security Considerations

[[tbd.security: Such as: how is the secondary resource safe from being modified without knowledge of the primary resource?]]

5.1. Use in Requests

In general, content codings can be used in both requests and responses. This particular content coding has been designed for responses. When supported in requests, it creates a new attack vector where the receiving server can be tricked into including content that the client might not have access to otherwise (such as HTTP resources behind a firewall).

6. IANA Considerations

The IANA "HTTP Content Coding Registry", located at <http://www.iana.org/assignments/http-parameters>, needs to be updated with the registration below:

Name: out-of-band

Description: Payload needs to be retrieved from a secondary resource

Reference: Section 3 of this document

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, DOI 10.17487/RFC3986, January 2005, <http://www.rfc-editor.org/info/rfc3986>.

[RFC7159] Bray, T., "The JavaScript Object Notation (JSON) Data Interchange Format", RFC 7159, DOI 10.17487/RFC7159, March 2014, <http://www.rfc-editor.org/info/rfc7159>.

[RFC7230] Fielding, R., Ed. and J. Reschke, Ed., "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", RFC 7230, DOI 10.17487/RFC7230, June 2014, <http://www.rfc-editor.org/info/rfc7230>.

[RFC7231] Fielding, R., Ed. and J. Reschke, Ed., "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content", RFC 7231, DOI 10.17487/RFC7231, June 2014, <http://www.rfc-editor.org/info/rfc7231>.

7.2. Informative References

[ENCRYPTENC] Thomson, M., "Encrypted Content-Encoding for HTTP", draft-thomson-http-encryption-00 (work in progress), May 2015.

[RFC6454] Barth, A., "The Web Origin Concept", RFC 6454, DOI 10.17487/RFC6454, December 2011,

<http://www.rfc-editor.org/info/rfc6454>.

URIs

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

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

Appendix A. Alternatives, or: why not a new Status Code?

A plausible alternative approach would be to implement this functionality one level up, using a new redirect status code (Section 6.4 of [RFC7231]). However, this would have several drawbacks:

- Servers will need to know whether a client understands the new status code; thus some additional signal to opt into this protocol would always be needed.

- In redirect messages, representation metadata (Section 3.1 of [RFC7231]), namely "Content-Type", applies to the response message, not the redirected-to resource.

Appendix B. Open Issues

B.1. Range Requests

We probably need to handle Range Requests. How would this work? Passing down the Range request header field to the secondary resource?

What about codes other than 200 and 206?

Appendix C. Acknowledgements

Thanks to Goran Eriksson, Mark Nottingham, and Martin Thomson for feedback on this document.

Authors' Addresses

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

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

Salvatore Loreto
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

EMail: salvatore.loreto@ericsson.com