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'Out-Of-Band' Content Coding for HTTP
draft-reschke-http-oob-encoding-09

Abstract

This document describes an Hypertext Transfer Protocol (HTTP) content coding that can be used to describe the location of a secondary resource that contains 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/EricssonResearch/Blind-Cache-Drafts> and <http://greenbytes.de/tech/webdav/#draft-reschke-http-oob-encoding>.

The changes in this draft are summarized in Appendix D.9.

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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This Internet-Draft will expire on May 3, 2017.

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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 contains the payload.

The primary use case for this content coding is to enable origin servers to securely 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 ([SCD]), leveraging content encryption ([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:

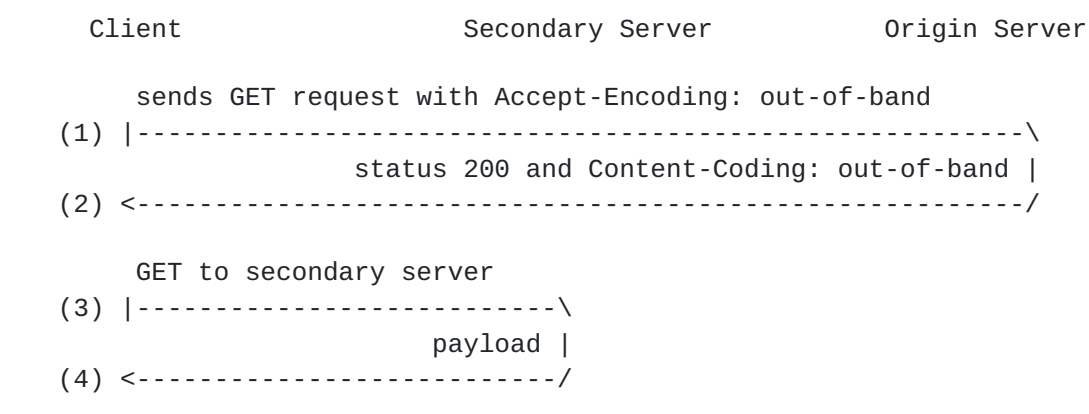
1. Client performs a request

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 payload

5. 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 object describing secondary resources; currently only defining one member:

'sr' A REQUIRED array of JSON objects. Objects having a member named 'r' describe a secondary resource, with the member's string value containing a URI reference (Section 4.1 of [RFC3986]) of the secondary resource (URI references that are relative references are resolved against the URI of the primary resource).

The payload format uses an array so that the origin server can specify multiple secondary resources. The ordering within the array reflects the origin server's preference (if any), with the most preferred secondary resource location being first. Clients receiving a response containing multiple entries are free to choose which of these to use.

In some cases, the origin server might want to specify a "fallback URI"; identifying a secondary resource served by the origin server itself, but otherwise equivalent "regular" secondary resources. Any secondary resource hosted by the origin server can be considered to be a "fallback"; origin servers will usually list them last in the "sr" array so that they only will be used by clients when there is no other choice.

New specifications can define new OPTIONAL member fields, thus clients MUST ignore unknown fields. Furthermore, new specifications can define new object formats for the 'sr' array; however, they MUST

NOT use a member named 'r' unless the semantics are compatible with those defined above.

Extension specifications will have to update this specification.

3.3. Processing Steps

Upon receipt of an 'out-of-band' encoded response, a client first needs to obtain the secondary resource's presentation. This is done using an HTTP GET request (independently of the original request method).

In order to prevent any leakage of information, the GET request for the secondary resource MUST only contain information provided by the origin server or the secondary server itself, namely HTTP authentication credentials ([RFC7235]) and cookies ([RFC6265]).

Furthermore, the request MUST include an "Origin" header field indicating the origin of the original resource ([RFC6454], Section 7). The secondary server MUST verify that the specified origin is authorized to retrieve the given payload (or otherwise return an appropriate 4xx status code).

In addition to that, the secondary server's response MUST include a "Content-Type" header field indicating an Internet media type of "application/oob-stream". Clients MUST check for this media type and abort out-of-band processing if no media type is specified, or if it doesn't match this value.

After receipt of the secondary resource's payload, the client then reconstructs the original message by:

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

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.

If the client is unable to retrieve the secondary resource's representation (host can't be reached, non 2xx response status code, payload failing integrity check, etc.), it can choose an alternate secondary resource (if specified), try the fallback URI (if given), or simply retry the request to the origin server without including 'out-of-band' in the Accept-Encoding request header field. In the latter case, it can be useful to inform the origin server about what problems were encountered when trying to access the secondary resource; see Appendix A for details.

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.

Use of the 'out-of-band' coding is similar to HTTP redirects ([RFC7231], Section 6.4) in that it can lead to cycles. Unless with HTTP redirects, the client however is in full control: it does not need to advertise support for the 'out-of-band' coding in requests for secondary resources. Alternatively, it can protect itself just like for HTTP redirects -- by limiting the number of indirections it supports.

Note that because the server's response depends on the request's Accept-Encoding header field, the response usually will need to be declared to vary on that. See Section 7.1.4 of [RFC7231] and Section 2.3 of [RFC7232] for details.

3.4. Examples

3.4.1. Basic Example

Client request of primary resource at https://www.example.com/test:

```
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: 165
Vary: Accept-Encoding

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

(note that the Content-Type header field describes the media type of the secondary's resource representation, and the origin server supplied a fallback URI)

Client request for secondary resource:

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

Response:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:10 GMT
Cache-Control: private
Content-Type: application/oob-stream
Content-Length: 15

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

Hello, world.
```

3.4.2. Example for an attempt to use 'out-of-band' cross-origin

Section 3.3 requires the client to include an "Origin" header field in the request to a secondary server. The example below shows how the server for the secondary resource would respond to a request which contains an "Origin" header field identifying an unauthorized origin.

Continuing with the example from Section 3.4.1, and a secondary server that is configured to allow only access for requests initiated by "https://www.example.org":

Client request for secondary resource:

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

Response:

```
HTTP/1.1 403 Forbidden
Date: Thu, 14 May 2015 18:52:10 GMT
```

Note that a request missing the "Origin" header field would be treated the same way.

[[anchor5: Any reason why to *mandate* a specific 4xx code?]]

3.4.3. Example involving an encrypted resource

Given the example HTTP message from Section 5.1 of [ENCRYPTENC], a primary resource could use the 'out-of-band' coding to specify just the location of the secondary resource plus the contents of the "Crypto-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: aesgcm, out-of-band
Content-Type: text/plain
Encryption: keyid="a1"; salt="vr0o6Uq3w_KDWeatc27mUg"
Crypto-Key: keyid="a1"; aesgcm="csPJEXBYA5U-Tal9EdJi-w"
Content-Length: 101
Vary: Accept-Encoding

{
  "sr": [
    { "r" :
      "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)

Response for secondary resource:

```
HTTP/1.1 200 OK
Date: Thu, 14 May 2015 18:52:10 GMT
Content-Type: application/oob-stream
Content-Length: ...

VDeU0XxaJkOJDAxPl7h9JD5V8N43RorP7PfpPdZZQuwF
```

(payload body shown in base64 here)

Final message undoing all content codings:

```
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
```

Note: in this case, the ability to undo the 'aesgcm' is needed to process the response. If 'aesgcm' wasn't listed as acceptable content coding in the request, the origin server wouldn't be able to use the 'out-of-band' mechanism.

3.4.4. Relation to Content Negotiation

Use of the 'out-of-band' encoding is a case of "proactive content negotiation", as defined in Section 3.4 of [RFC7231].

This however does not rule out combining it with other content codings. As an example, the possible iteractions with the 'gzip' content coding ([RFC7230], Section 4.2.3) are described below:

Case 1: Primary resource does not support 'gzip' encoding

In this case, the response for the primary resource will never include 'gzip' in the Content-Encoding header field. The secondary resource however might support it, in which case the client could negotiate compression by including "Accept-Encoding: gzip" in the request to the secondary resource.

Case 2: Primary resource does support 'gzip' encoding

Here, the origin server would actually use two different secondary resources, one of them being gzip-compressed. For instance -- going back to the first example in Section 3.4.1 -- it might reply with:

```
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: gzip, out-of-band
Content-Length: 165
Vary: Accept-Encoding

{
  "sr": [
    { "r" :
      "http://example.net/bae27c36-fa6a-11e4-ae5d-00059a3c7a01"},
    { "r" :
      "/c/bae27c36-fa6a-11e4-ae5d-00059a3c7a01"}
  ]
}
```

which would mean that the payload for the secondary resource already is gzip-compressed.

> Note: The origin server could also apply gzip compression to the out-of-band payload, in which case the Content-Encoding field value would become: "gzip, out-of-band, gzip".

4. Content Codings and Range Requests

The combination of content codings ([RFC7231], Section 3.1.2 with range requests ([RFC7233]) can lead to surprising results, as applying the range request happens after applying content codings.

Thus, for a request for the bytes starting at position 100000 of a video:

```
GET /test.mp4 HTTP/1.1
Host: www.example.com
Range: bytes=100000-
Accept-Encoding: identity
```

...a successful response would use status code 206 (Partial Content) and have a payload containing the octets starting at position 100000.

```
HTTP/1.1 206 Partial Content
Date: Thu, 08 September 2015 16:49:00 GMT
Content-Type: video/mp4
Content-Length: 134567
Content-Range: bytes 100000-234566/234567

(binary data)
```

However, if the request would have allowed the use of 'out-of-band' coding:

```
GET /test.mp4 HTTP/1.1
Host: www.example.com
Range: bytes=100000-
Accept-Encoding: out-of-band
```

...a server might return an empty payload (if the out-of-band coded response body would be shorter than 100000 bytes, as would be usually the case).

Thus, in order to avoid unnecessary network traffic, servers SHOULD NOT apply range request processing to responses using ouf-of-band content coding (or, in other words: ignore "Range" request header fields in this case).

5. 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.

6. Security Considerations

6.1. Content Modifications

This specification does not define means to verify that the payload obtained from the secondary resource really is what the origin server expects it to be. Content signatures can address this concern (see [CONTENTSIG] and [MICE]).

6.2. Content Stealing

The 'out-of-band' content coding could be used to circumvent the same-origin policy ([RFC6454], Section 3) of user agents: an attacking site which knows the URI of a secondary resource would use the 'out-of-band' coding to trick the user agent to read the contents of the secondary resource, which then, due to the security properties of this coding, would be handled as if it originated from the origin's resource.

This scenario is addressed by the client requirement to include the "Origin" request header field and the server requirement to verify that the request was initiated by an authorized origin. In addition, the restriction of the secondary server response's media type to "application/oob-stream" protects existing content on "regular" servers not implementing this specification.

> Note: similarities with the "Cross-Origin Resource Sharing" protocol ([CORS]) are intentional.

Requiring the secondary resource's payload to be encrypted ([ENCRYPTENC]) is an additional mitigation.

6.3. 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).

7. IANA Considerations

7.1. Content Coding: out-of-band

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

7.2. Internet Media Type: application/oob-stream

IANA maintains the registry of Internet media types [BCP13] at <http://www.iana.org/assignments/media-types>.

This document serves as the specification for the Internet media type "application/oob-stream". The following is to be registered with IANA.

The "application/oob-stream" media type represents a sequence of octets sent as part of the "out-of-band" content coding protocol exchange. The sender does not have any further information about the type of the enclosed data. This type is different from "application/octet-stream" as it is known not to be in use for pre-existing content.

Type name: application

Subtype name: oob-stream

Required parameters: N/A

Optional parameters: N/A

Encoding considerations: always "binary"

Security considerations: see Section 6

Interoperability considerations: N/A

Published specification: This specification (see Section 7.2).

Applications that use this media type: HTTP servers for secondary resources as defined by this specification.

Fragment identifier considerations: N/A

Additional information:

Magic number(s): N/A

Deprecated alias names for this type: N/A

File extension(s): N/A

Macintosh file type code(s): N/A

Person and email address to contact for further information: See Authors' Addresses section.

Intended usage: COMMON

Restrictions on usage: N/A

Author: See Authors' Addresses section.

Change controller: IESG

8. References

8.1. Normative References

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[RFC6265] Barth, A., "HTTP State Management Mechanism", RFC 6265, DOI 10.17487/RFC6265, April 2011, <http://www.rfc-editor.org/info/rfc6265>.

[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>.

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8.2. Informative References

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[CONTENTSIG] Thomson, M., "Content-Signature Header Field for HTTP", draft-thomson-http-content-signature-00 (work in progress), July 2015.

[CORS] van Kesteren, A., "Cross-Origin Resource Sharing", W3C Recommendation REC-cors-20140116, January 2014, <http://www.w3.org/TR/2014/REC-cors-20140116/>.

Latest version available at <http://www.w3.org/TR/cors/>.

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[MICE] Thomson, M., "Merkle Integrity Content Encoding", draft-thomson-http-mice-02 (work in progress), October 2016.

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[RFC7233] Fielding, R., Ed., Lafon, Y., Ed., and J. Reschke, Ed., "Hypertext Transfer Protocol (HTTP/1.1): Range Requests", RFC 7233, DOI 10.17487/RFC7233, June 2014, <http://www.rfc-editor.org/info/rfc7233>.

[SCD] Thomson, M., Eriksson, G., and C. Holmberg, "An Architecture for Secure Content Delegation using HTTP", draft-thomson-http-scd-02 (work in progress), October 2016.

URIs

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

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

Appendix A. Problem Reporting

[[erwip: This is a rough proposal for an error reporting mechanism. Is it good enough? Is it needed at all? Note that Alt-Svc doesn't have anything like this.]]

When the client fails to obtain the secondary resource, it can be useful to inform the origin server about the condition. This can be accomplished by adding a "Link" header field ([RFC5988]) to a subsequent request to the origin server, detailing the URI of the secondary resource and the failure reason.

The following link extension relations are defined:

[[purl: need to register PURLs (now hosted by archive.org, FWIW)]]

A.1. Server Not Reachable

Used in case the server was not reachable.

Link relation:

http://purl.org/NET/linkrel/not-reachable

A.2. Resource Not Found

Used in case the server responded, but the object could not be obtained.

Link relation:

http://purl.org/NET/linkrel/resource-not-found

A.3. Payload Unusable

Used in case the payload could be obtained, but wasn't usable (for instance, because integrity checks failed).

Link relation:

http://purl.org/NET/linkrel/payload-unusable

A.4. TLS Handshake Failure

Used in case of a TLS handshare failure ([RFC5246]).

Link relation:

http://purl.org/NET/linkrel/tls-handshake-failure

A.5. Example For Problem Reporting

Client requests primary resource as in Section 3.4.1, but the attempt to access the secondary resource fails.

Response:

```
HTTP/1.1 404 Not Found
Date: Thu, 08 September 2015 16:49:00 GMT
Content-Type: text/plain
Content-Length: 20

Resource Not Found
```

Client retries with the origin server and includes Link header field reporting the problem:

```
GET /test HTTP/1.1
Host: www.example.com
Accept-Encoding: gzip, out-of-band
Link: <http://example.net/bae27c36-fa6a-11e4-ae5d-00059a3c7a00>;
      rel="http://purl.org/NET/linkrel/resource-not-found"
```

Appendix B. 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.
- The origin-preserving nature of using a content coding would be lost.

Another alternative would be to implement the indirection on the level of the media type using something similar to the type "message/external-body", defined in [RFC2017] and refined for use in the Session Initiation Protocol (SIP) in [RFC4483]. This approach though would share most of the drawbacks of the status code approach mentioned above.

Appendix C. Open Issues

C.1. Accessing the Secondary Resource Too Early

One use-case for this protocol is to enable a system of "blind caches", which would serve the secondary resources. These caches might only be populated on demand, thus it could happen that whatever mechanism is used to populate the cache hasn't finished when the client hits it (maybe due to race conditions, or because the cache is behind a middlebox which doesn't allow the origin server to push content to it).

In this particular case, it can be useful if the client was able to "piggyback" the URI of the fallback for the primary resource, giving

the secondary server a means by which it could obtain the payload itself. This information could be provided in yet another Link header field:

```
GET /bae27c36-fa6a-11e4-ae5d-00059a3c7a00 HTTP/1.1
Host: example.net
Link: <http://example.com/c/bae27c36-fa6a-11e4-ae5d-00059a3c7a00>;
      rel="http://purl.org/NET/linkrel/fallback-resource"
```

(continuing the example from Section 3.4.1)

C.2. Resource maps

When 'out-of-band' coding is used as part of a caching solution, the additional round trips to the origin server can be a significant performance problem; in particular, when many small resources need to be loaded (such as scripts, images, or video fragments). In cases like these, it could be useful for the origin server to provide a "resource map", allowing to skip the round trips to the origin server for these mapped resources. Plausible ways to transmit the resource map could be:

- as extension in the 'out-of-band' coding JSON payload, or
- as separate resource identified by a "Link" response header field.

This specification does not define a format, nor a mechanism to transport the map, but it's a given that some specification using 'out-of-band' coding will do.

C.3. Fragmenting

It might be interesting to divide the original resource's payload into fragments, each of which being mapped to a distinct secondary resource. This would allow to not store the full payload of a resource in a single cache, thus

- distribute load,
- caching different parts of the resource with different characteristics (such as only distribute the first minutes of a long video), or
- fetching specific parts of a resource (similar to byte range requests), or

- hiding information from the secondary server.

Another benefit might be that it would allow the origin server to only serve the first part of a resource itself (reducing time to play of a media resource), while delegating the remainder to a cache (however, this might require further adjustments of the 'out-of-band' payload format).

C.4. Relation to Content Encryption

Right now this specification is orthogonal to [ENCRYPTENC]/[MICE]; that is, it could be used for public content such as software downloads. However, the lack of mandatory encryption affects the security considerations (which currently try to rule attack vectors caused by ambient authority ([RFC6265], Section 8.2). We need to decide whether we need this level of independence.

C.5. Reporting

This specification already defines hooks through which a client can report failures when accessing secondary resources (see Appendix A).

However, it would be useful if there were also ways to report on statistics such as:

- Success (Cache Hit) rates, and

- Bandwidth to secondary servers.

This could be implemented using a new service endpoint and a (JSON?) payload format.

Similarly, a reporting facility for use by the secondary servers could be useful.

C.6. Controlling Transmission Of Various Request Header Fields

Clients by default might include request header fields such as "User-Agent" (or some of the newly defined "Client Hints") into their requests to the secondary server. If the secondary server does not perform any content negotiation, none of these header fields is actually useful, so suppressing them by default might be a good idea to reduce fingerprinting. In this case, we could allow the origin server to opt into sending some of them though.

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

D.1. Changes since draft-reschke-http-oob-encoding-00

Mention media type approach.

Explain that clients can always fall back not to use oob when the secondary resource isn't available.

Add Vary response header field to examples and mention that it'll usually be needed (<https://github.com/reschke/oobencoding/issues/6>).

Experimentally add problem reporting using piggy-backed Link header fields (<https://github.com/reschke/oobencoding/issues/7>).

D.2. Changes since draft-reschke-http-oob-encoding-01

Updated ENCRYPTENC reference.

D.3. Changes since draft-reschke-http-oob-encoding-02

Add MICE reference.

Remove the ability of the secondary resource to contain anything but the payload (<https://github.com/reschke/oobencoding/issues/11>).

Changed JSON payload to be an object containing an array of URIs plus additional members. Specify "fallback" as one of these additional members, and update Appendix C.1 accordingly).

Discuss extensibility a bit.

D.4. Changes since draft-reschke-http-oob-encoding-03

Mention "Content Stealing" thread.

Mention padding.

D.5. Changes since draft-reschke-http-oob-encoding-04

Reduce information leakage by disallowing ambient authority information being sent to the secondary resource. Require "Origin" to be included in request to secondary resource, and require secondary server to check it.

Mention "Origin" + server check on secondary resource as defense to content stealing.

Update ENCRYPTENC reference, add SCD reference.

Mention fragmentation feature.

Discuss relation with range requests.

D.6. Changes since draft-reschke-http-oob-encoding-05

Remove redundant Cache-Control: private from one example response (the response payload is encrypted anyway).

Mention looping.

Remove 'metadata' payload element.

Align with changes in ENCRYPTENC spec.

Fix incorrect statement about what kind of cookies/credentials can be used in the request to the secondary resource.

Rename "URIs" to "sr" ("secondary resources") and treat the fallback URI like a regular secondary resource.

Mention reporting protocol ideas.

D.7. Changes since draft-reschke-http-oob-encoding-06

Changed the link relation name to the fallback resource from "primary" to "fallback". Added link relation for reporting TLS handshake failures.

Added an example about the interaction with 'gzip' coding.

Update ENCRYPTENC, MICE, and SCD references.

D.8. Changes since draft-reschke-http-oob-encoding-07

Restrict the valid media types for the response of the secondary server to "application/oob-stream".

Changed JSON format to allow annotation (optional flags) and entirely new types of entries.

D.9. Changes since draft-reschke-http-oob-encoding-08

Moved error reporting into appendix (because it's optional and we're not sure about the utility of it). See <https://github.com/EricssonResearch/Blind-Cache-Drafts/issues/4>.

Updated references for ENCRYPTENC, MICE, and SCD.

Mention that we could suppress certain request header fields in the request to the secondary server.

Appendix E. Acknowledgements

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