Signing HTTP Messages

draft-ietf-httpbis-message-signatures

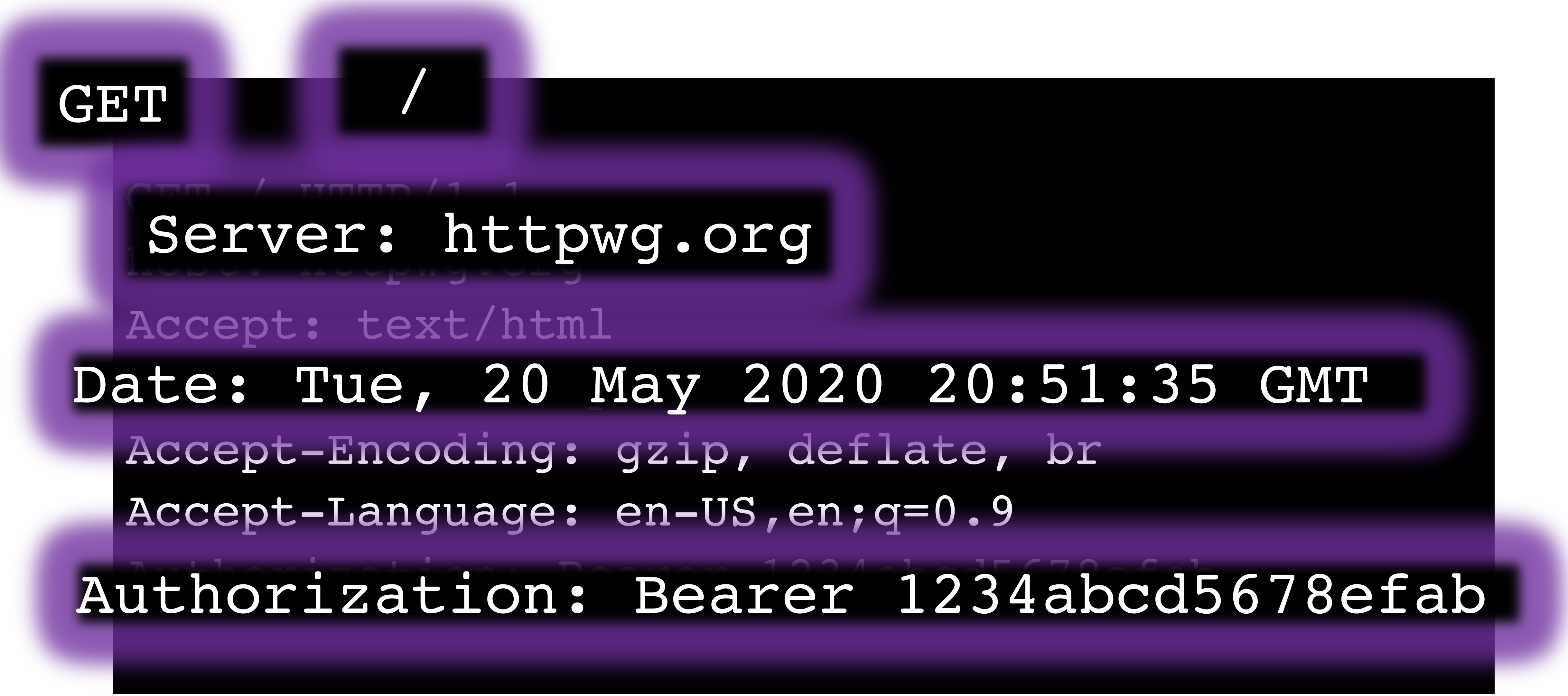
HTTP Working Group Virtual Interim Meeting

May 26, 2020

Durable Signatures Over HTTP Message Parts

```
GET / HTTP/1.1
Host: httpwg.org
Accept: text/html
Date: Tue, 20 May 2020 20:51:35 GMT
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Authorization: Bearer 1234abcd5678efab
```

Identify Elements to Sign


GET
/
Server: httpwg.org
Date: Tue, 20 May 2020 20:51:35 GMT
Authorization: Bearer 1234abcd5678efab

```
GET / HTTP/1.1
Host: httpwg.org
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Authorization: Bearer 1234abcd5678efab
```

Create Signature Input

```
GE      /
Da
A
```

```
(created): 1590007895
(request-target): GET /
host: httpwg.org
authorization: Bearer 1234abcd5678efab
```

Attach Signature to Message

```
Signature: keyId="test-key-a",
  created=1590007895,
  headers="(created) (request-target)
    host authorization"
  signature="1234567890abcdef..."
```

Status

- Adopted as working group item
- Published -00 draft
- Converted to Markdown
- Open issues, big and small

Incoming Changes: Structured Headers

```
Signature-Input: sig1=(::request-target,
    host, authorization);
  keyId="key-a";
  created=159000789

Signature: sig1=:AbCd1234...==:
```

Structured Headers: Two Header Fields

- Signature-Input
  - Replaces "headers" parameter
  - Dictionary of lists
  - Other parameters as…parameters
- Signature
  - Dictionary of byte sequences

```
Signature-Input: sig1=(
    ::request-target, host,
    authorization);
  keyId="test-key-a";
  created=159000789

Signature: sig1=:AbCd1234...==:
```

Parameters on Content Identifiers

```
Signature-Input: sig2=(cookie;name=my_cookie,
    signature;id=sig1,
    list-header;count=4,
    dict-header;key=foo);
  keyId="key-b";
  created=159000789
```

Multiple Signatures

```
Signature-Input: sig2=(
  signature;key=sig1,
  x-forwarded-for);
  keyId="key-b";
  created=159000789

Signature: sig2=:AbCd1234...==:
```

Problems Solved

- Confusing "headers" parameter name
- Bespoke header field value format
- Signature parameters are not signed
- Support multiple signatures
  - over different content
  - with different keys
- Signing parts of unstructured headers (e.g., specific cookies)
- Signing parts of structured headers

- …Signature input construction?

`Signature-Input` in Signature Input

```
(::request-target, host, authorization);
  keyId="key-a"; created=159000789
::request-target: GET /
host: httpwg.org
authorization: Bearer 1234abcd5678efab
```

Next Task: `keyId` and `algorithm`

- JWA: use it, reference it, or duplicate it?

- Key and algorithm coupling
  - Was: separate `keyId` and `algorithm` parameters
  - Now: vestigal `algorithm` parameter; key definition determines all

Effects of the Coupling `keyId` and `algorithm`

- Prevents signer from using arbitrary algorithms
- Completely externalizes algorithm definition, identification
- Requires multiple key IDs to use the same key with multiple algorithms
    - Maybe this is good, actually?
- …will implementers invent structured `keyId` formats?

Other Open Items/Next Steps

- Alignment with Web Packaging's Signed Exchanges
- Signature input format (bespoke or not?)
- Improve serialization rules (e.g., % encoding, collapsing whitespace)
- More content identifiers (::method, ::path, ::query, …)