JSON Web Proofs

JWTs with Superpowers*

JSON Web Proofs

What it is

- Data container for supporting “anonymous credentials” style use cases
- Features such as:
  - Selective Disclosure
  - Multi-use without linkability
  - Predicate Proofs

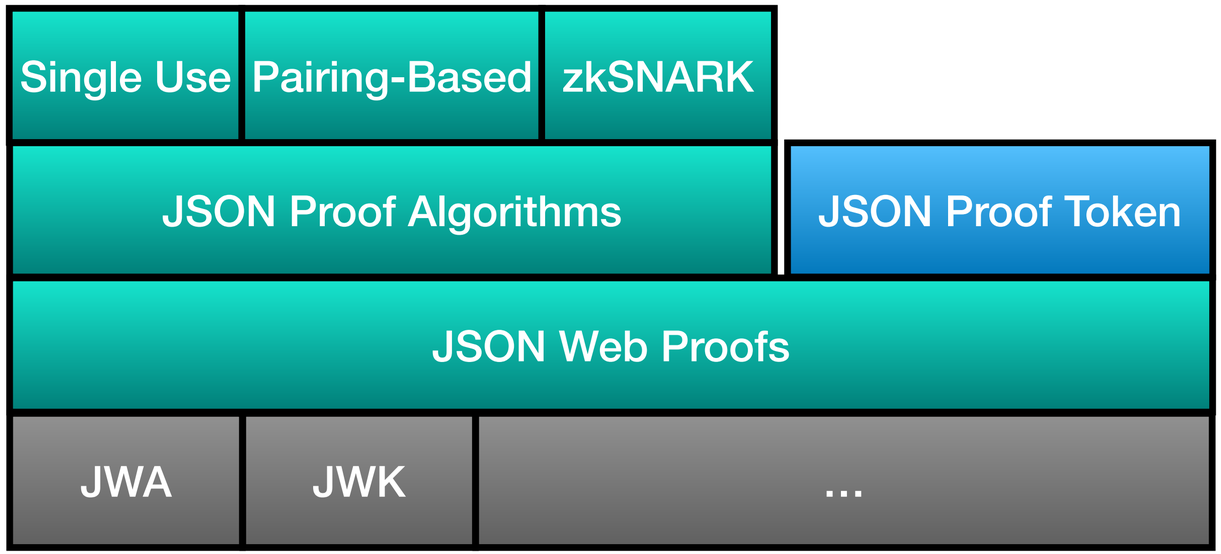
JSON Web Proofs

Standards Relations

- Incubated within Decentralized Identity Foundation Advanced Crypto WG
- Very Early!
- JOSE (JSON Object Signing and Encryption) inspired
  - Various JWA, JWK, JWT dependencies
- Would like to see it moved to IETF following incubation
- Also motivated to define an equivalent CBOR-format container

JSON Web Proof Structure

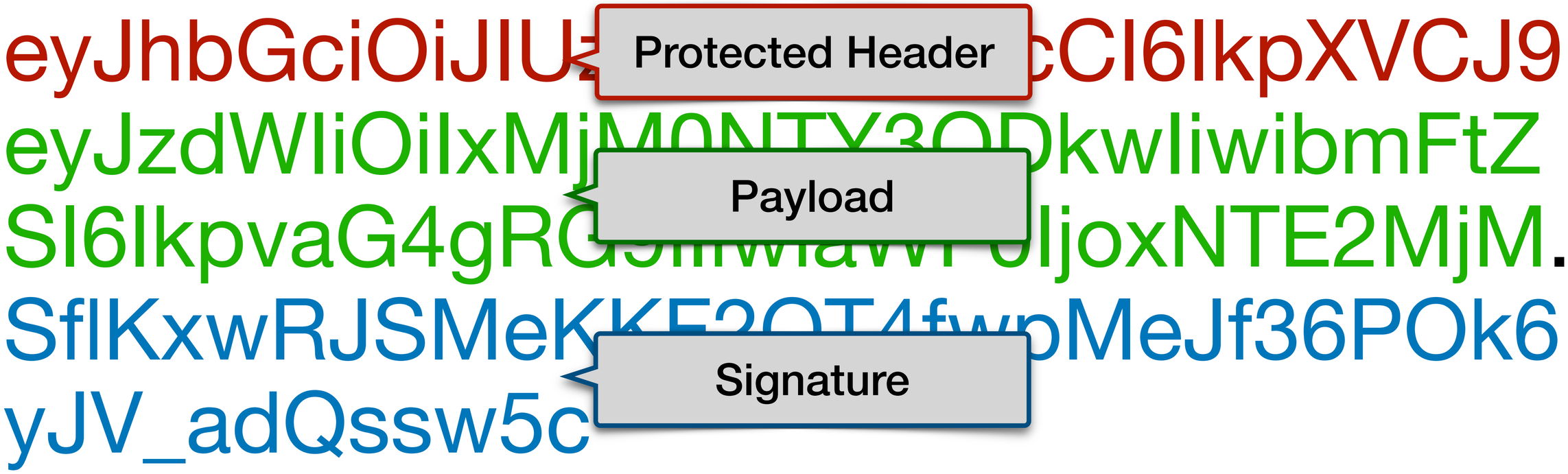
(As envisioned)



Classic JSON Web Signature

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.
eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZ
SI6IkpvaG4gRG9lIiwiaWF0IjoxNTE2MjM.
SflKxwRJSMeKKF2QT4fwpMeJf36POk6
yJV_adQssw5c

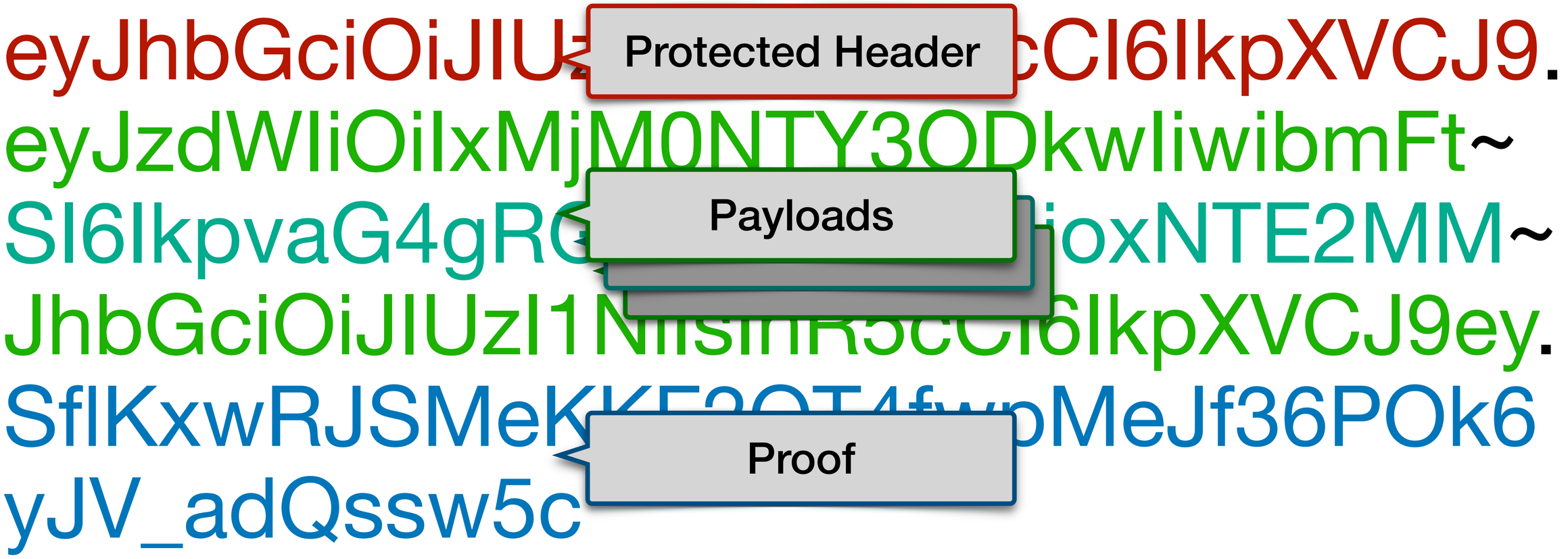
Classic JSON Web Signature



JSON Web Proof

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.
eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFt~
SI6IkpvaG4gRG9lIiwiaWF0IjoxNTE2MM~
JhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9ey.
SflKxwRJSMeKKF2QT4fwpMeJf36POk6
yJV_adQssw5c

JSON Web Proof



JSON Web Proof

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~~.SflKxwRJSMeKKF2QT4fwpMeJf36P
Ok6yJV_adQssw5c

Two Omitted Payloads

JSON Proof Token

For Token/Credential-style Use-cases

«Protected Header»

```
{
  "alg": "ES256",
  "typ": "JWT"
}
```

«Payload»

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "iat": 1516239022
}
```

JWT Example

«Protected Header»

```
{
  "alg": “ES256+SU”,
  "typ": “JPT",
  "kid": "12345"
}
```

«Payloads»

```
"1234567890"

"John Doe"

1516239022
```

JPT Example

JSON Proof Token

For Token/Credential-style Use-cases

```
{
   "jwks": [
      {
         "kid": "12345",
         …,
         "token-payloads": [
            { "claim": "sub" },
            { "claim": "name" },
            { "claim": "iat" }
         ]
      }
   ]
}
```

Issuer Metadata

«Protected Header»

```
{
  "alg": "ES256+SU",
  "typ": "JPT",
  "kid": "12345"
}
```

«Payloads»

```
"1234567890"

"John Doe"

1516239022
```

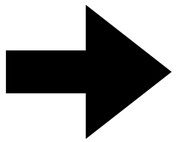
JPT Example

JSON Proof Token

Omitting a payload

```
{
   "jwks": [
      {
         "kid": "12345",
         …,
         "token-payloads": [
            { "claim": "sub" },
            { "claim": "name" },
            { "claim": "iat" }
         ]
      }
   ]
}
```

Issuer Metadata



«Protected Header»

```
{
  "alg": "ES256+SU",
  "typ": "JPT",
  "kid": "12345"
}
```

«Payloads»

```
"1234567890"

"John Doe"

1516239022
```

JPT Example

Single Use Scheme

- Proof is simply a concatenation of signatures, e.g.
  Sig(*header* || *Sig(payload$_1$)* || … || *Sig(payload$_n$)***) || Sig(payload$_1$) || … || Sig(payload$_n$)**
- One could imagine a variety of other approaches (seeded Merkel tree, etc)
  - Multiple signatures is just easier to specify and implement
- Allows for use of NIST approved algorithms, out-of-box crypto support (including secure element usage)
- Does not expose some primitives needed for a subset of predicate algorithms
  - Other approaches available for selective disclosure, such as hash chains