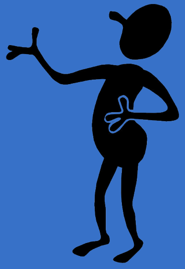
HRR400MCWBI

Aaron Gable
Let’s Encrypt

Pass the SALT
July 5, 2024

How to Revoke and Replace 400 Million Certificates Without Breaking the Internet



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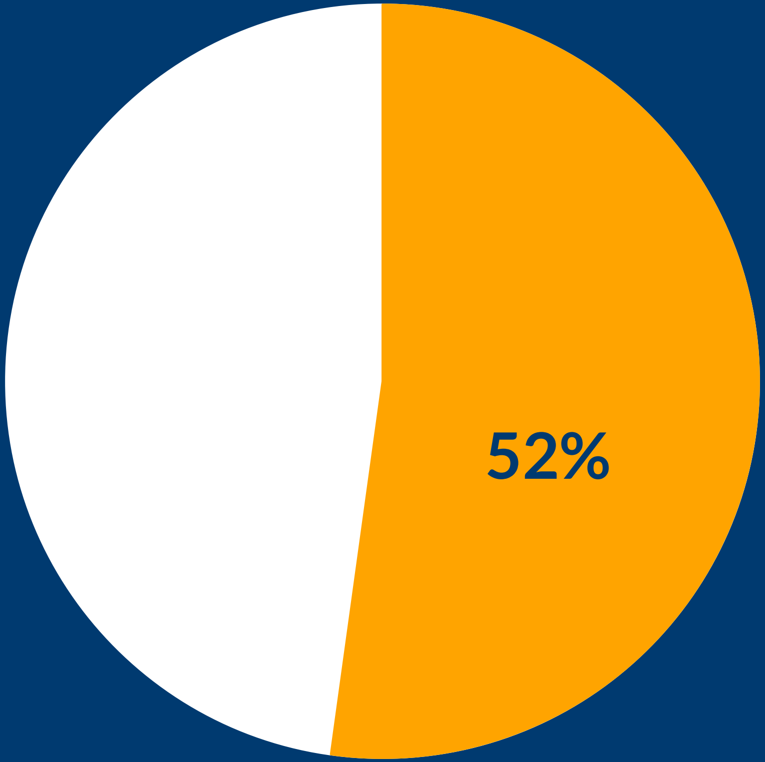
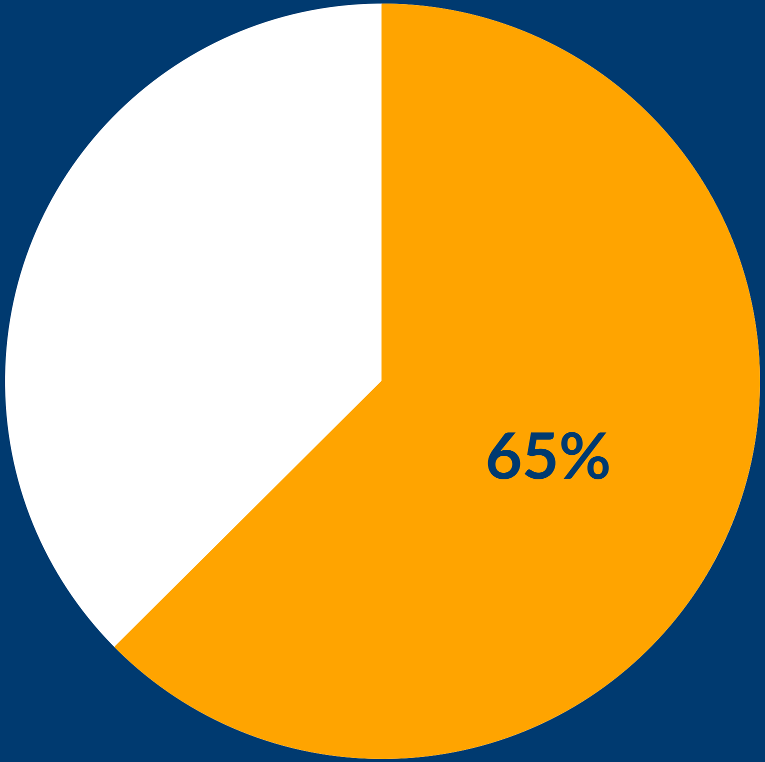
Let’s
Encrypt

The Web

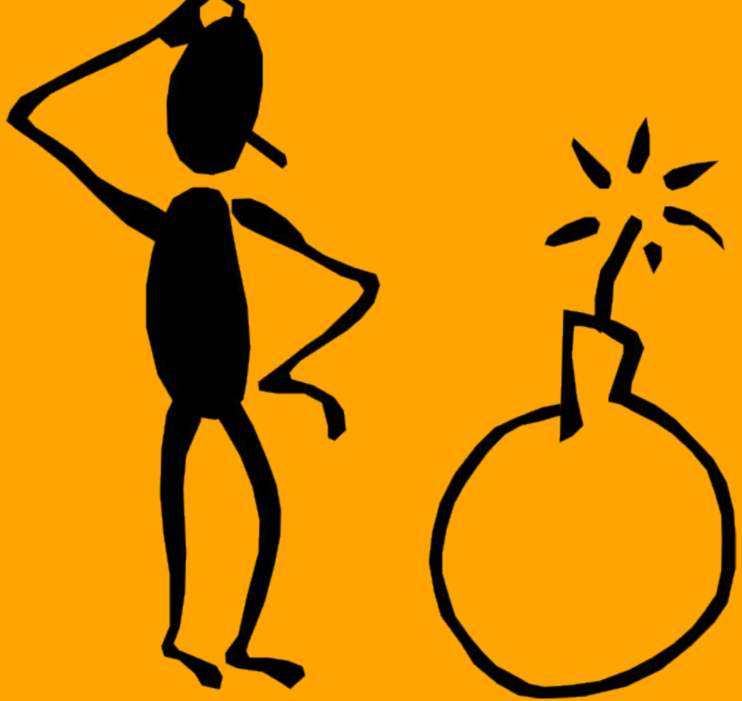


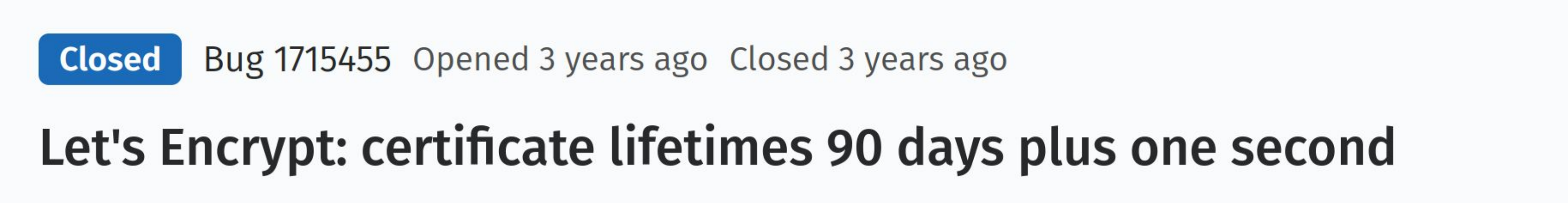
The WebPKI



375M Certificates

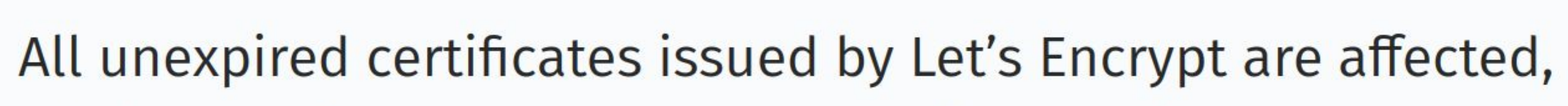
430M Domains





Closed Bug 1715455 Opened 3 years ago Closed 3 years ago

Let's Encrypt: certificate lifetimes 90 days plus one second



All unexpired certificates issued by Let’s Encrypt are affected,

What happens if you revoke everything?

What **breaks** if you revoke everything?

🖋 OCSP to revoke

🖋 Replacement certificate

+ 🖋 OCSP for new cert

---

3 🖋/ 📜

× 400M 📜

1.2 Billion 🖋

÷ 750 🖋/ second

18.5 Days

🖋 OCSP to revoke

🖋 Replacement certificate

+ 🖋 OCSP for new cert

---

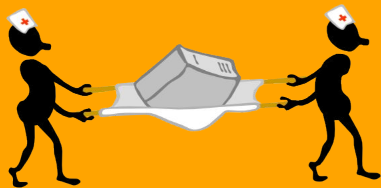
3 🖋/ 📃

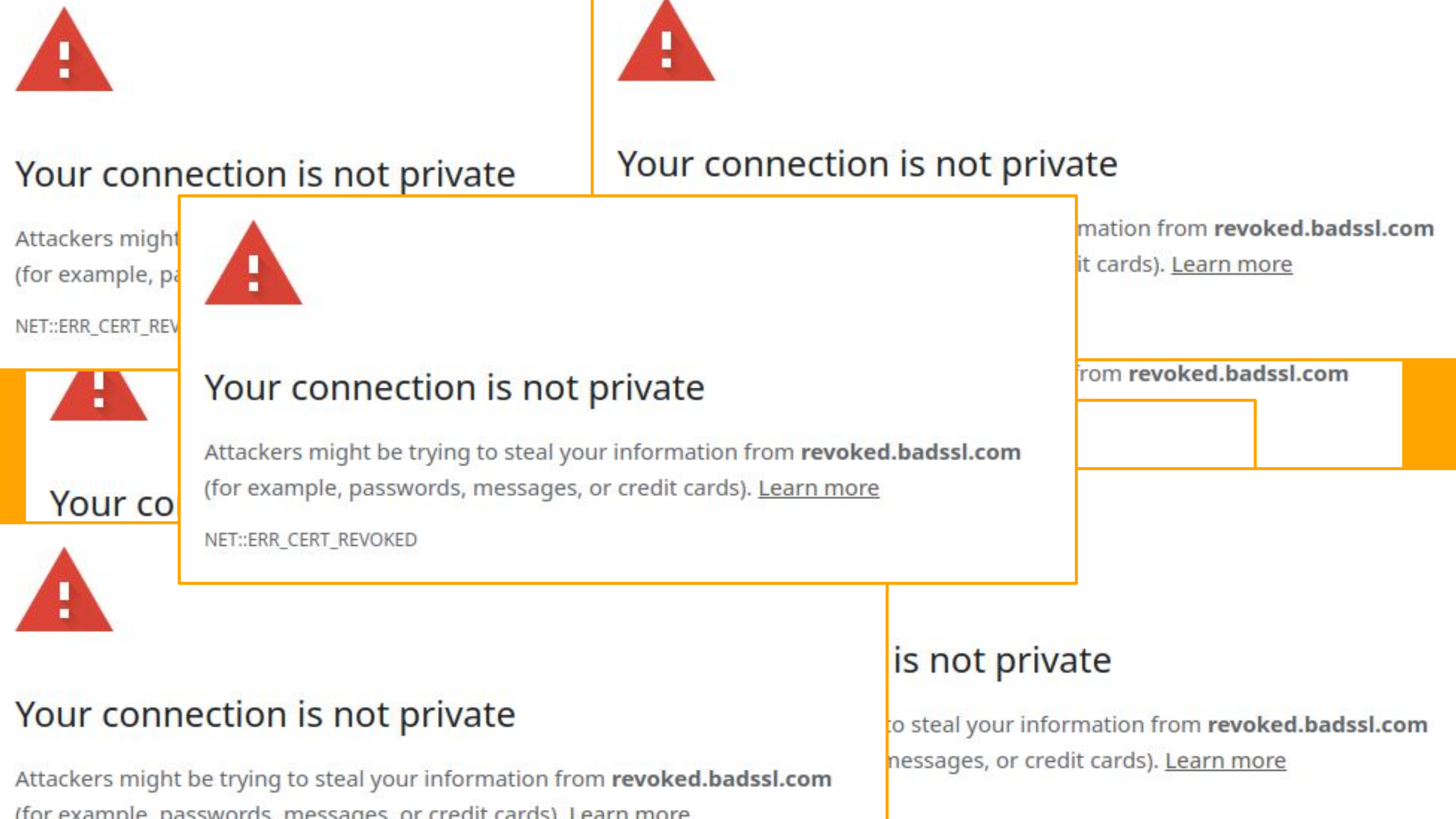
× 400M 📃

1.2 Billion 🖋

÷ 10,000 🖋/ second

1.4 Days





Your connection is not private

Attackers might be trying to steal your information from **revoked.badssl.com** (for example, passwords, messages, or credit cards). Learn more

NET::ERR_CERT_REVOKED

Your connection is not private

Attackers might

(for example, pa

NET::ERR_CERT_REV

Your connection is not private

mation from **revoked.badssl.com**

it cards). Learn more

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Your co

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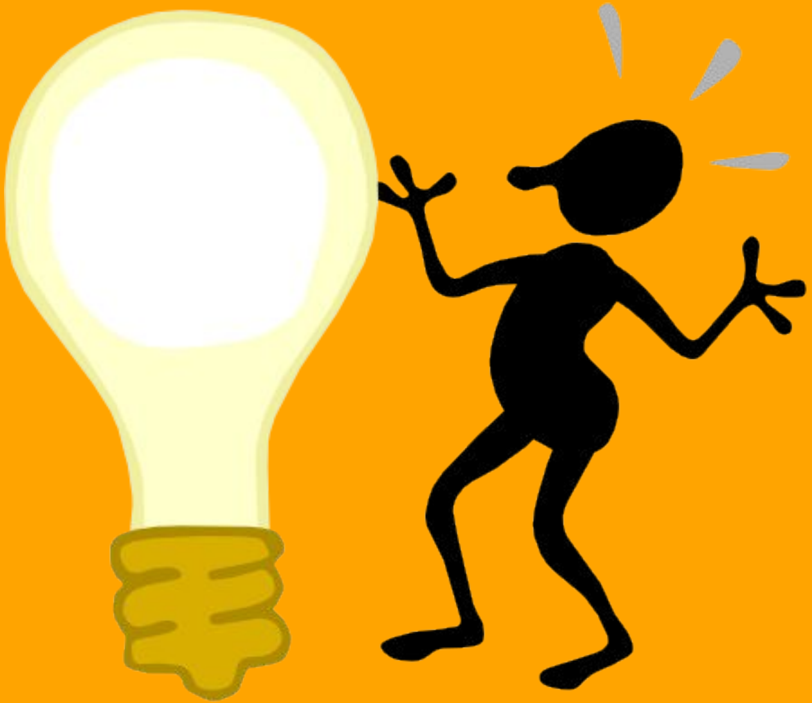


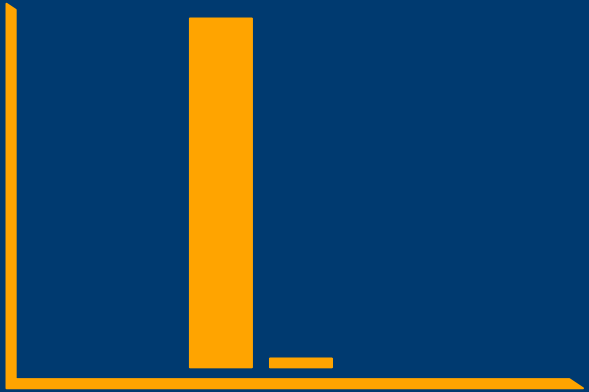
1. On-Demand OCSP ✅
2. ACME Renewal Info 🕘
3. Short-Lived Certificates 👀

1. On-Demand OCSP

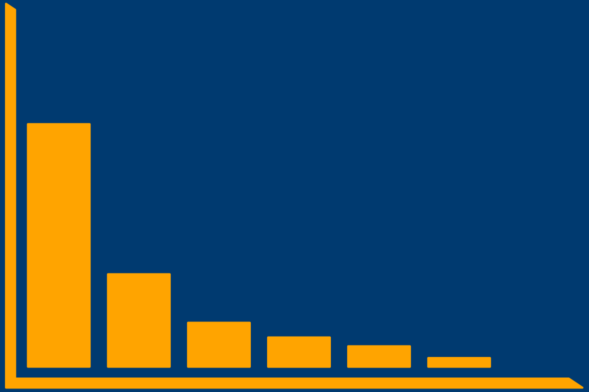
- OCSP to revoke
- Replacement certificate
- OCSP for new cert

Replacement certificate

OCSP Signatures per Certificate



Pre-Signing



Live-Signing

🖋️ Replacement certificate

+

1 🖋️/ 📃

× 400M 📃

400M 🖋️

÷ 10,000 🖋️/ second

0.45 Days

2. ACME Renewal Info

Q: When should I renew?

A:

```
GET /acme/renewal-info/aYhba4...IdlQyE
{
  "suggestedWindow": {
    "start": "2024-07-03 00:00:00",
    "end":   "2024-07-05 00:00:00"
  }
}
```

Q: Can this cert be revoked?

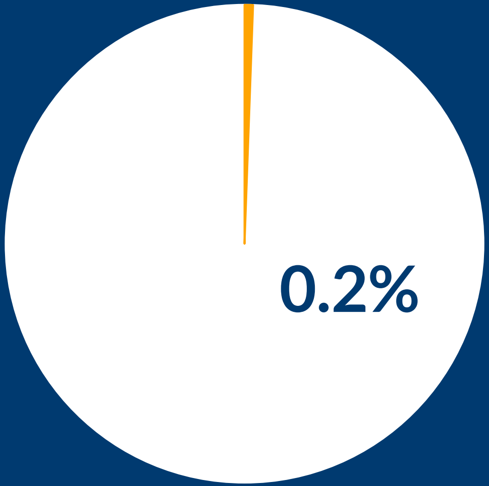
A:

```
POST /acme/new-order
{
  "identifiers": [
    "example.com", "www.example.com"
  ],
  "replaces": "aYhba4...IdlQyE"
}
```

draft-ietf-acme-ari-04

3+ ACME servers

10+ ACME clients



3. Short-Lived Certificates

Baseline Requirements, Section 4.9.1 “Circumstances for revocation”

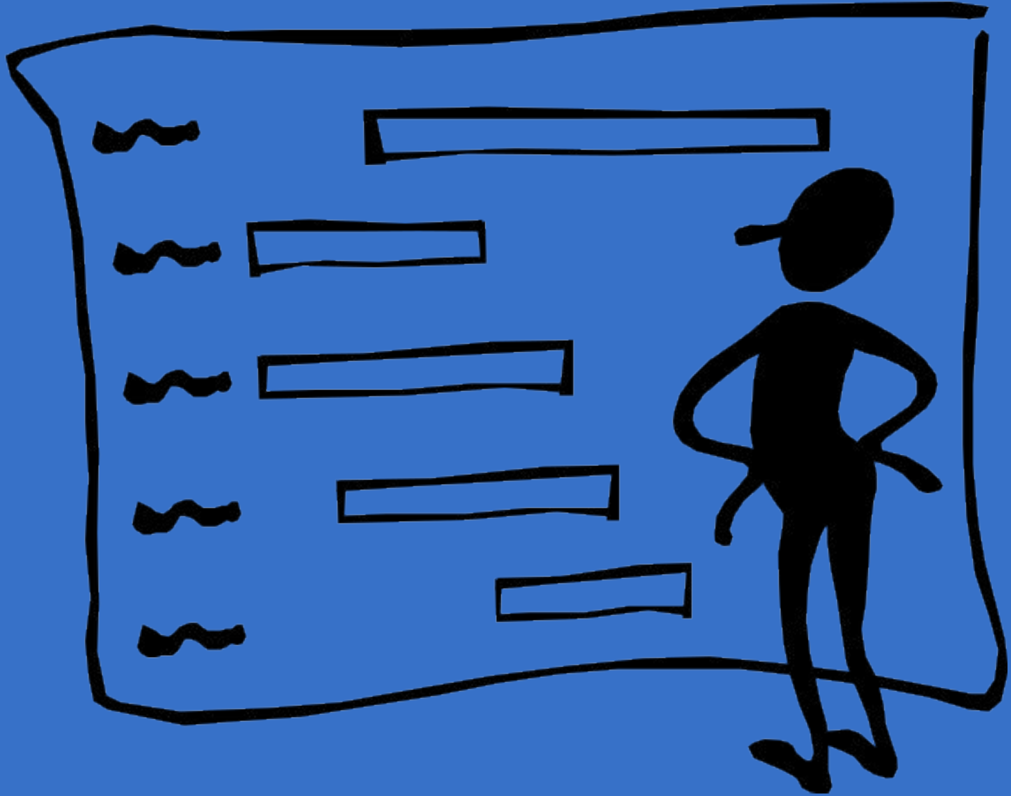
> ***With the exception of Short-lived Subscriber Certificates…***

Baseline Requirements, Section 1.6 “Short-Lived Subscriber Certificate”

> *…a Validity Period less than or equal to 10 days.*

```
notBefore:
    2024-07-03 01:02:03

notAfter:
    2024-07-10 01:02:03
```



Thank You!

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