Google | Privacy, Safety & Security

Updates on Google's PQC migration

Sophie Schmieg, Google

RWPQC, March 08, 2026

The four main areas of cryptography

Asymmetric Encryption

Used mainly for encryption in transit, allows sending confidential messages to another party, by negotiating a shared key.

Digital Signatures

Used very widely, allows for proof of documents being genuine.

Symmetric Cryptography

Used very widely, especially for encryption at rest and for actually transferring data for encryption in transit, allows to encrypt data with a key.

Fancy Cryptography

Various other uses of cryptography, often to accomplish complicated privacy guarantees.

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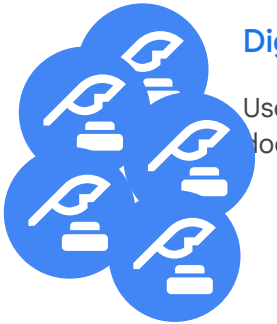
Vulnerable to Store Now Decrypt Later



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- SSH ✅ (2025)
- TLS Customer facing encryption in transit ✅ (February 2026)
- Long tail remains ❌

Example Long Tail

 *

Corp X25519MLKEM768

* This is not a yak. It is a bison, for copyright reasons.

Example Long Tail

Corp X25519MLKEM768

Windows DirectAccess

only supports RSA

* Yaks might be more closely related to bison than to domestic cattle, so it's not that bad.

Example Long Tail

Corp X25519MLKEM768

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RSA-PSS mistake in TPM 2.0 spec *

* Do not attempt to shave bisons. They will kill you.

Example Long Tail

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RSA-PSS mistake in TPM 2.0 spec

TLS 1.3 only supports RSA-PSS for client certs *

* No seriously, do not approach the danger cow.

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RSA-PSS mistake in TPM 2.0 spec

TLS 1.3 only supports RSA-PSS for client certs

TLS and DirectAccess share credentials *

* This picture was taken with a telelens. No cryptographers were harmed.

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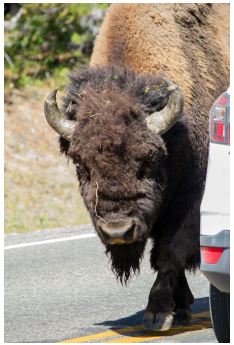

Credentials are stored in TPM *

* No bisons were harmed either.

Example Long Tail

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In conclusion: No X25519MLKEM768 due to lacking RSA-PSS support in a ten year old spec

* Yes, I took more than one bison picture.

What is new? Digital Signatures

- Cloud KMS (2025)

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- Cloud KMS (2025)
- Prototyping MTC (2026)
- Limited internal deployments

What is new? Conclusions

- ML-KEM deployment is making progress, but long tail remains

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- Signature use cases are more difficult due to key management

Emergency Planning: Motivation

- Being surprised by a quantum computer is a business continuity risk

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- Long signature deployment timelines need special considerations

Emergency Planning: Two Scenarios

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Quantum Zero Day

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Accelerated Timeline

- Informed by public statements by quantum physicists
- Difficulty distinguishing signal from noise
- Public timeline might be lagging behind threat actors

Emergency Planning: Threat Model observations

many fast CRQCs

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- Likely targets include CAs, CT logs, and identity provider
- Difficult, but not impossible to detect directly

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- Business continuity planning for PQC can inform emergency plans
- Signature deployment is more important in an emergency timeline
- Active quantum computers are hard to detect

Thank you

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