IETF Hackathon

Post-Quantum Encrypted Client Hello

IETF 118
4–5 November 2023
Prague, Czech Republic

Hackathon Plan

- Making TLS 1.3 Extension “Encrypted Client Hello” *Quantum-Resistant*
- RFC’s and drafts involved:
  - RFC 8446 - TLS version 1.3
  - RFC 9180 - Hybrid Public Key Encryption (HPKE)
  - draft-ietf-tls-esni-17 - Extension Encrypted Client Hello

- Used WolfSSL + liboqs as our base implementation
- Added *Post-Quantum* algorithms in HPKE and eventually in ECH
- PQ-ECH is still work in progress…

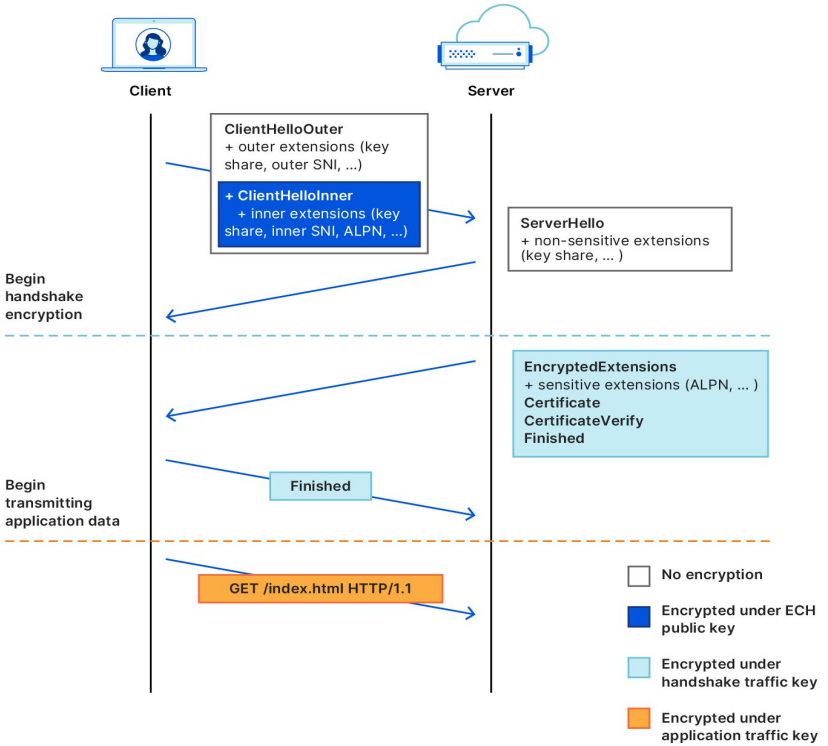


Image source: Cloudflare (link)

What got done

- Made HPKE run with Post-Quantum algorithms
  - Benchmarks created for PQ HPKE and PQ ECH
  - Measured the performance of PQ-HPKE

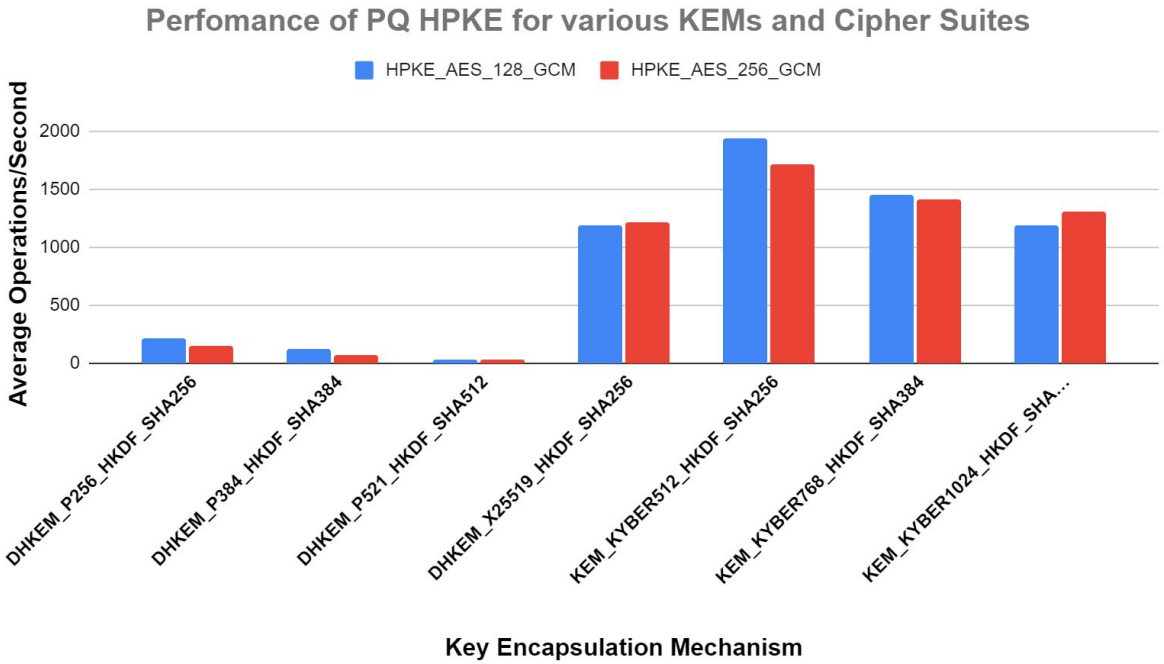
Issues resolved:

  - PQC key sizes significantly bigger
  - PQ KEMs (Kyber) has different operation compared to traditional ECDH based KEMs (key exchange)

- It is still a work in progress…
  - Full ECH PQ extension

What we learned

- Compared PQ algorithms for various KEMs and Cipher Suites
- PQ algorithms run **significantly** faster
  - At least for HPKE



Wrap Up

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First timers @ IETF/Hackathon:

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This work has received funding from the European Union's Horizon H2020 project EnerMan and Horizon Europe research and innovation programme SecOPERA under grant agreement and No 958478 and No 101070599 respectively