EU Activities in Post-Quantum Cryptography

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Post-quantum cryptography forum
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History of post-quantum cryptography

- 2003 Daniel J. Bernstein introduces term Post-quantum cryptography.
- PQCrypto 2006: International Workshop on Post-Quantum Cryptography. Held at KU Leuven, Belgium, organized by EU project ECRYPT.
- PQCrypto 2008 (US), PQCrypto 2010 (DE), PQCrypto 2011 (TW), PQCrypto 2013 (FR).
- 2014 EU publishes H2020 call including post-quantum crypto as topic. PQCRYPTO EU project is funded.

- September 2015: Initial recommendations by PQCRYPTO.
- 2015 ETSI working group "Quantum-Safe Cryptography (QSC)"
- 2016: NIST announces competition for post-quantum systems.
- November 2017: Submissions for NIST competition due. PQCRYPTO submits 22 designs (out of a total of 69).

Also in the EU: Quantum Technologies Flagship

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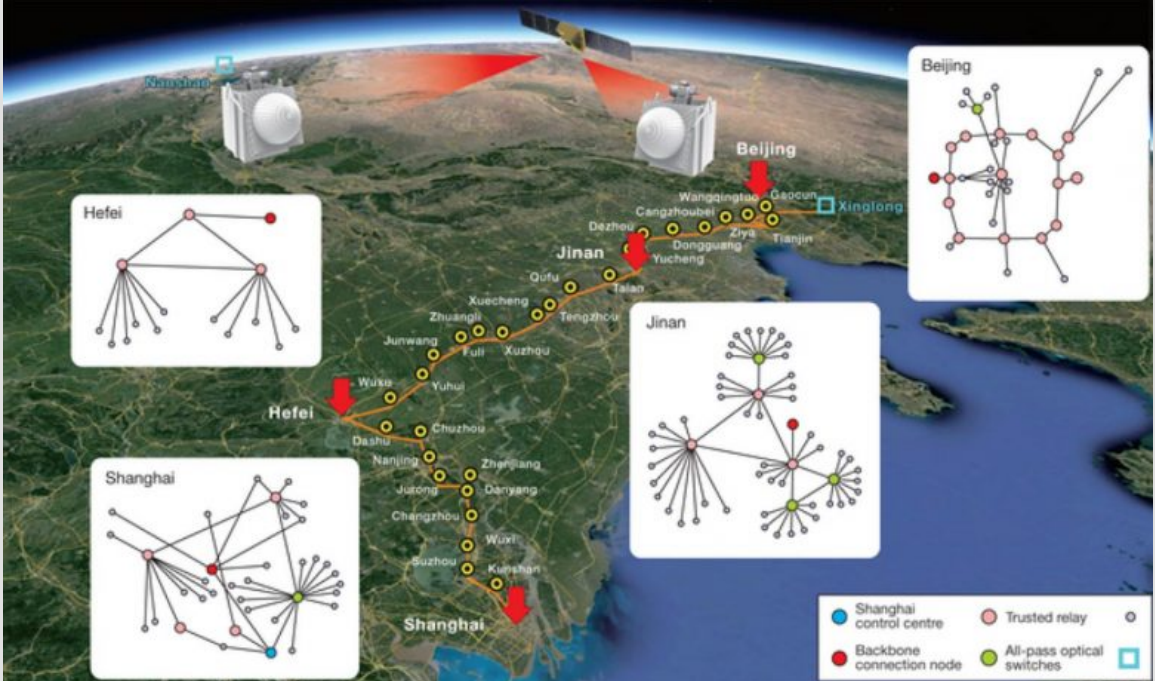
Beijing
Xinglong
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Talan
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Tengzhou
Junwang
Fuli
Xuzhou
Wuxie
Yuhui
Hefei
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Dashu
Nanjing
Zhenjiang
Jurong
Danyang
Changzhou
Wuxi
Suzhou
Kunshan
Shanghai
Hefei
Shanghai
Jinan
Beijing
Shanghai control centre
Trusted relay
Backbone connection node
All-pass optical switches

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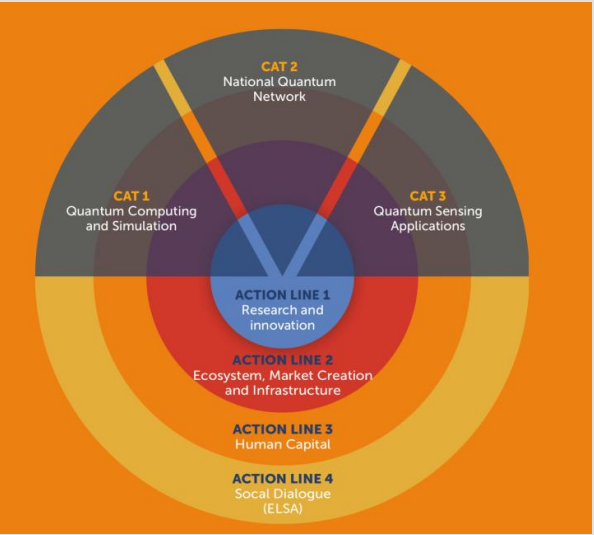
- Very limited functionality: e.g., no public-key signatures.

Somewhat better: Quantum Delta NL



Action line 1: Realization of research and innovation breakthroughs in six fields:

- Quantum computing
- Quantum sensing
- Quantum simulation
- Quantum algorithms
- Quantum communication
- Post-quantum cryptography

Action line 2: Ecosystem development, market creation and infrastructure

Action line 3: Human capital: education, knowledge and skills

Action line 4: Promotion of social dialogue regarding quantum technology

Detailed information: https://quantumdelta.nl/informationsession/

EU efforts involving post-quantum cryptography

H2020 projects:

- PQCRYPTO (2015–2018)
- SAFEcrypto (2015–2019)
- FutureTPM (2018–2021)
- PROMETHEUS

Upcoming call: Transition towards Quantum-Resistant Cryptography (Nov 2022).

National initiatives:

- Quantum-safe cryptography (NCSC-UK Whitepaper)
- Factsheet Post-quantum cryptography (by NCSC-NL)
- TechDispatch #2/2020: Quantum Computing and Cryptography (by European Data Protection Supervisor)
- Status of quantum computer development (by German BSI)
- ANSSI views on the Post-Quantum Cryptography transition (French agency)

Post-Quantum Cryptography: Current state and quantum mitigation

Ward Beullens, Jan-Pieter D'Anvers, Andreas Hülsing, Tanja Lange, Lorenz Panny, Cyprien de Saint Guilhem, Nigel P. Smart.
Evangelos Rekleitis, Angeliki Aktypi, Athanasios-Vasileios Grammatopoulos.

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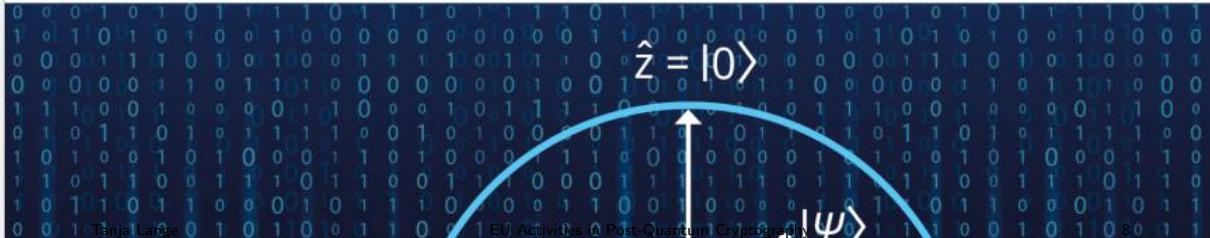

ENISA report: Current state and quantum mitigation

Chapters

1. Introduction
2. Families of Post-Quantum Algorithms
3. Security Notions and Generic Transforms
4. NIST Round 3 Finalists
5. Alternate Candidates
6. Quantum Mitigation
   - 6.1 Hybrid schemes
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Upcoming report: ENISA PQC Integration Study.