HellasQCI Use cases

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National Scale Architecture

Three test-sites:

- Athens (Capital of Greece) – Economic/Administrative Centre
- Thessaloniki - North Greece/ terrestrial boarder
- Heraklion/Crete - Island Greece, South European Boarder

Quantum Satellite Connectivity

- Builds on Helmos, Holomontas and Skinakas Optical Ground Stations
- All 3 telescopes part of ESA ARTES Skylight programme
- HellasQCI to provide the terrestrial links to th
- Connect to ESA Eagle-1 QKD satellite
- Implement the National Quantum Backbone Network
- Connect with other EU Member States
- Avoid costly terrestrial QKD links

Powerful Metropolitan Testbeds

## Three Quantum Network domains

- Governmental (GOV)
- Industrial (IND)
- Research and Innovation (EDU)

Extensive Metropolitan Networks

- \>12 Nodes in Athens
- \>6 nodes in Thessaloniki
- \>4 Nodes in Heraklion

Advanced QKD technologies

- Dynamic QKD for optimal resource allocation and flexible networking
- Co-existence of Quantum and Classical Channels
- Enhanced PUF encryption schemes
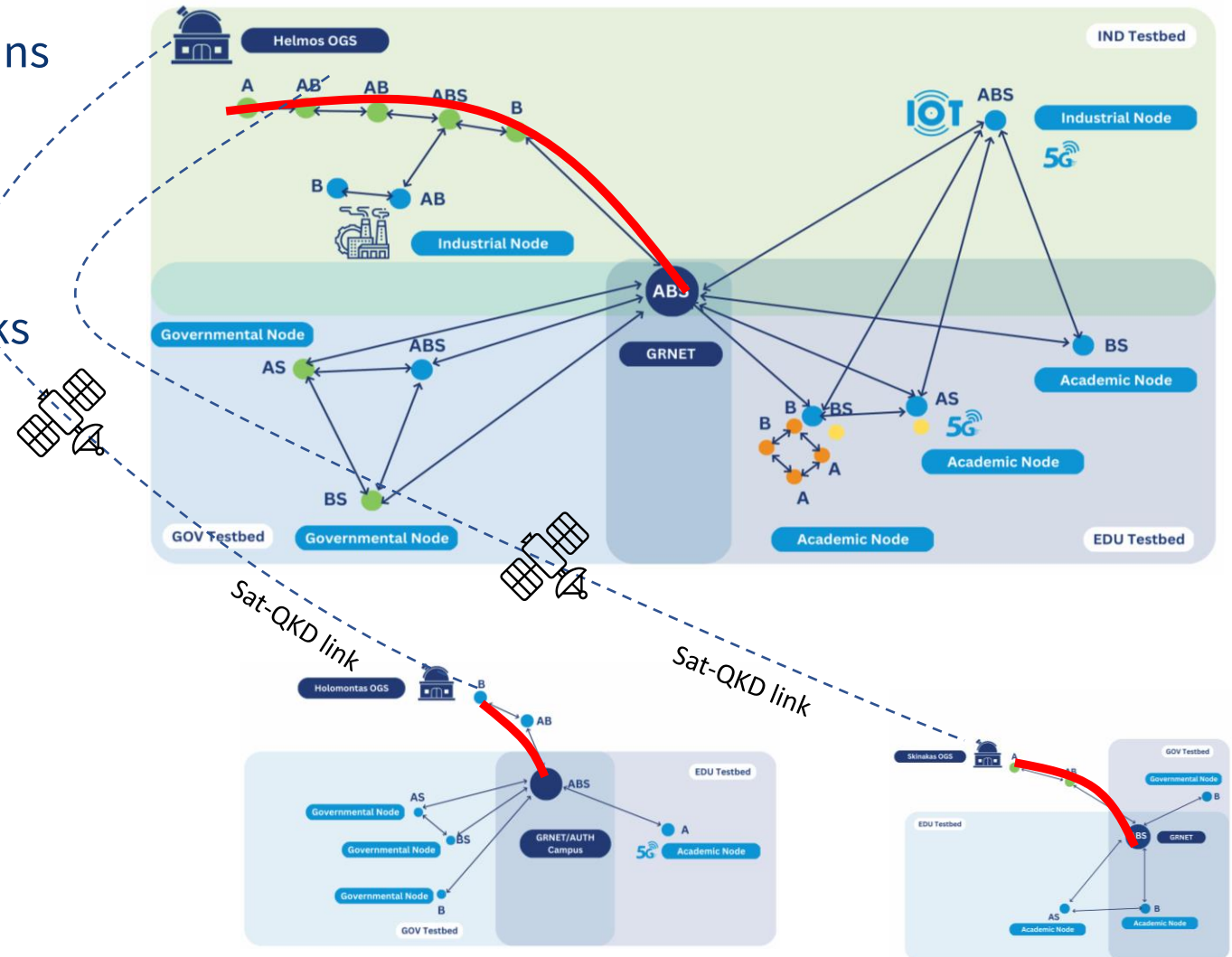
National Security

Use Case 1 — QKD for National Security

Use Case 2 — Enhanced QKD resilience for National Security Links

Use Case 3 — Satellite QKD connectivity for remote National Security Nodes

Use case 16 — HellasQCI space and terrestrial segments

Public Health

Use Case 4 — Secure communications for Public Safety applications

Use Case 5 — Quantum Secure technologies for cloud Health Applications

Use Case 6 — Secure transmission of medical imaging data for Public Hospitals

Use Case 7 — QKD for secure connectivity to supercomputing infrastructure

Industrial | Critical Infrastructure | ICT

Use Case 8 — Quantum cryptography to secure communication links of critical infrastructures

Use Case 9 — ICT sector | Secure storage in cloud data centres

Use case 10 — ICT sector | QKD over 5G

Use case 11 — ICT sector |Next Generation Quantum Secured FTTH services

Use case 15 — Preparation of a quantum encrypted software application

Research

Use case 12 — Preparing for the quantum internet

Use Case 13 — Advanced quantum network controls

Use case 14 — PUF-based hybrid authentication for switched QKD

Quantum Secure Public Sector

- **National Security**
- Use Case 1 — QKD for National Security
- Use Case 2 — Enhanced QKD resilience for National Security Links
- Use Case 3 — Satellite QKD connectivity for remote National Security Nodes
- Use case 16 — HellasQCI space and terrestrial segments
- **Public Health**
- Use Case 4 — Secure communications for Public Safety applications
- Use Case 5 — Quantum Secure technologies for cloud Health Applications
- Use Case 6 — Secure transmission of medical imaging data for Public Hospitals
- Use Case 7 — QKD for secure connectivity to supercomputing infrastructure

Support ICT technology development

☐ Industrial and Academic partners have demonstrated novel technologies for QKD
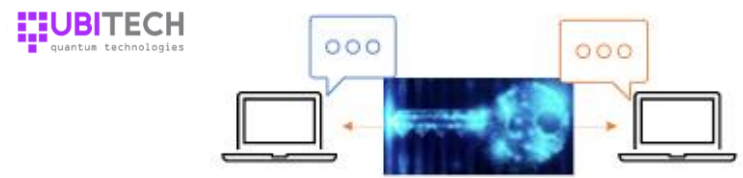☐ HellasQCI offers a field testbed as the sandpit to further develop the technologies
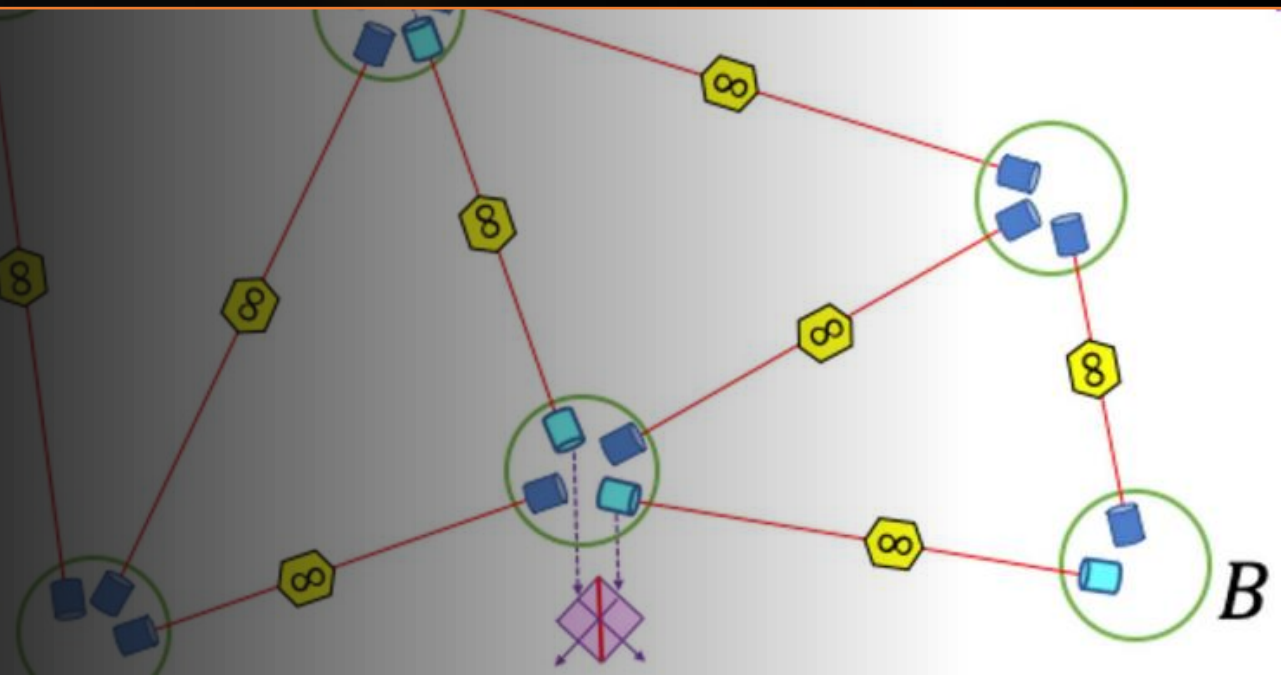
QKD over 5G
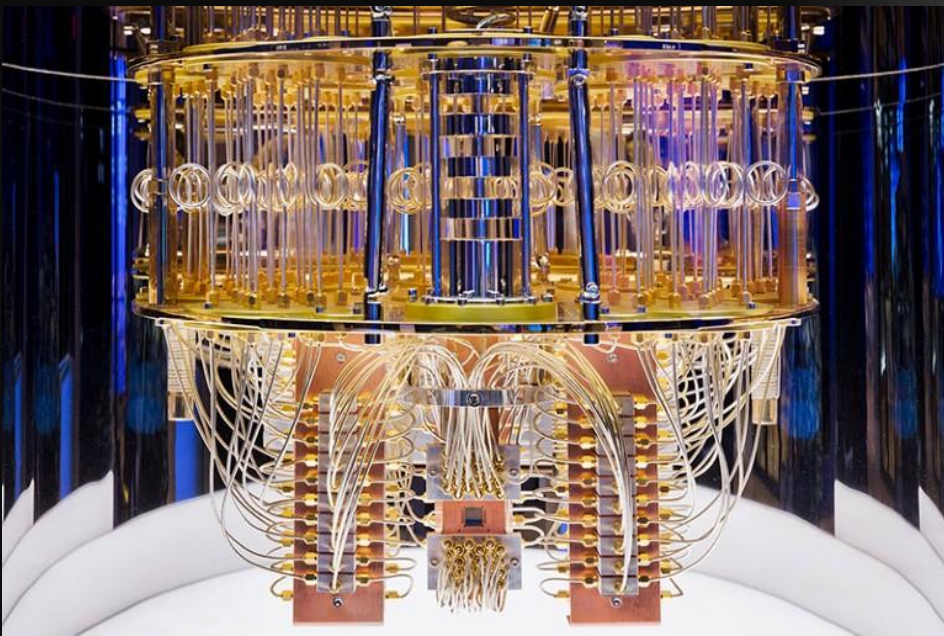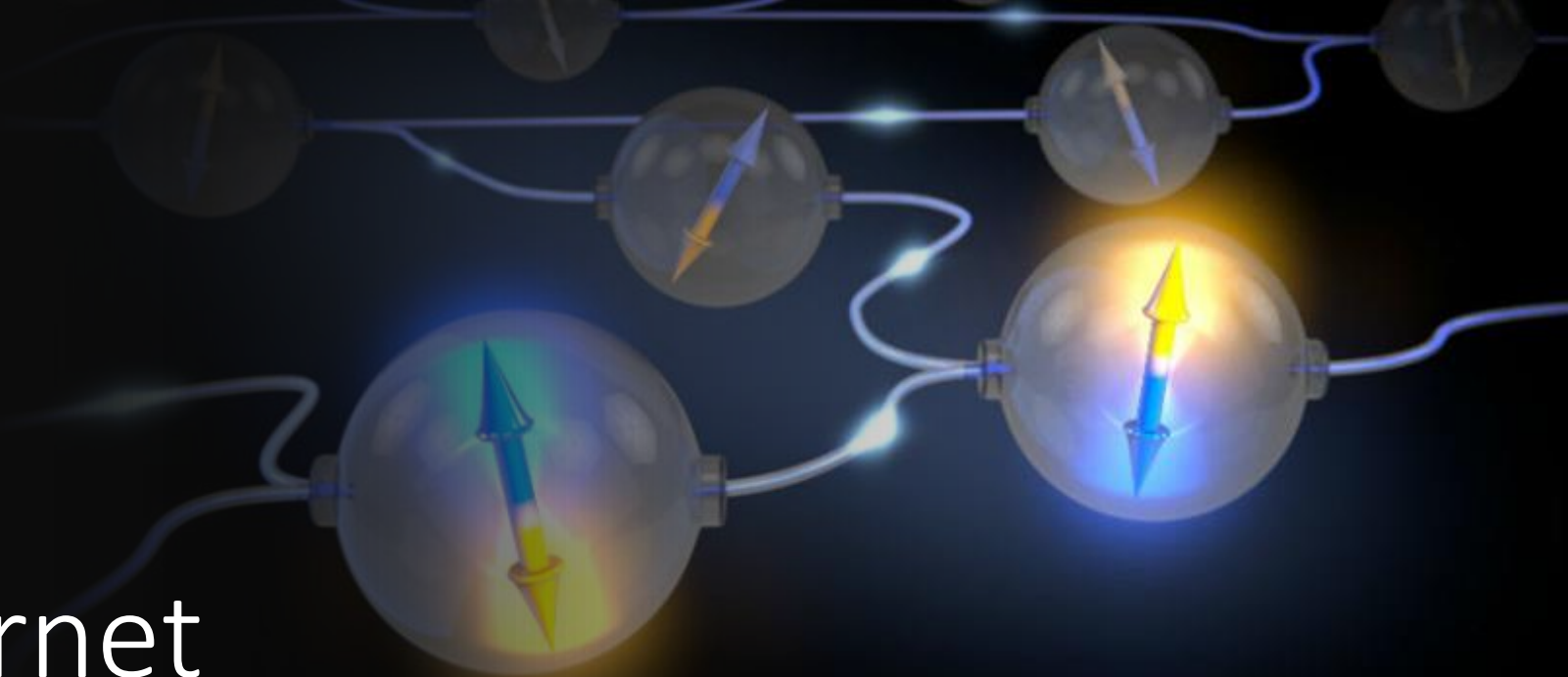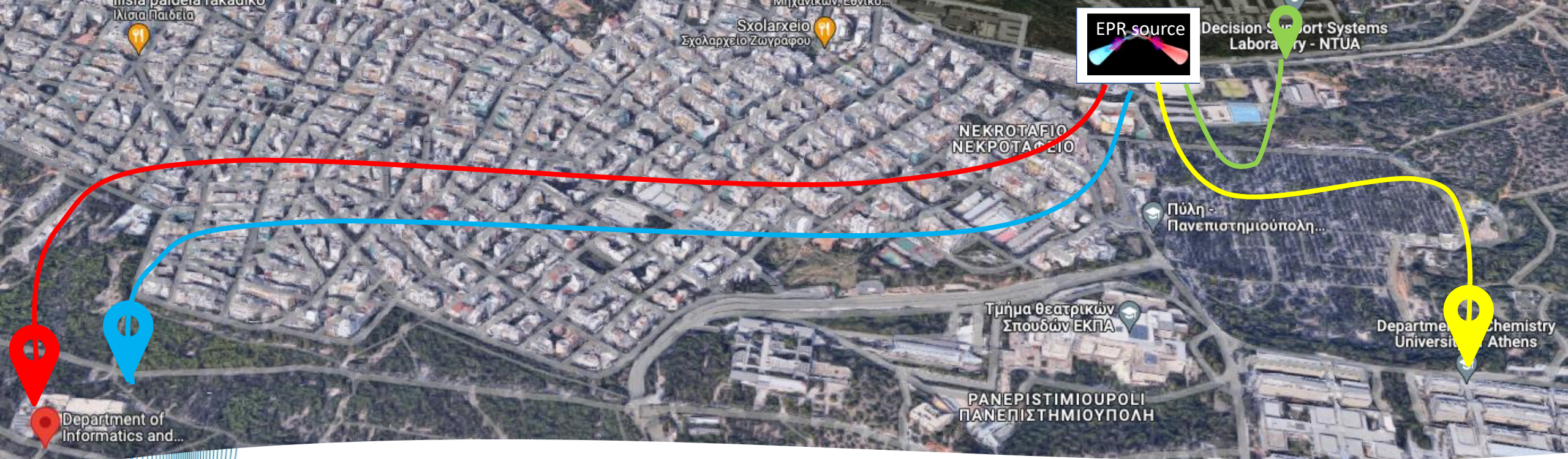QKD for FTTH
QKD for DC
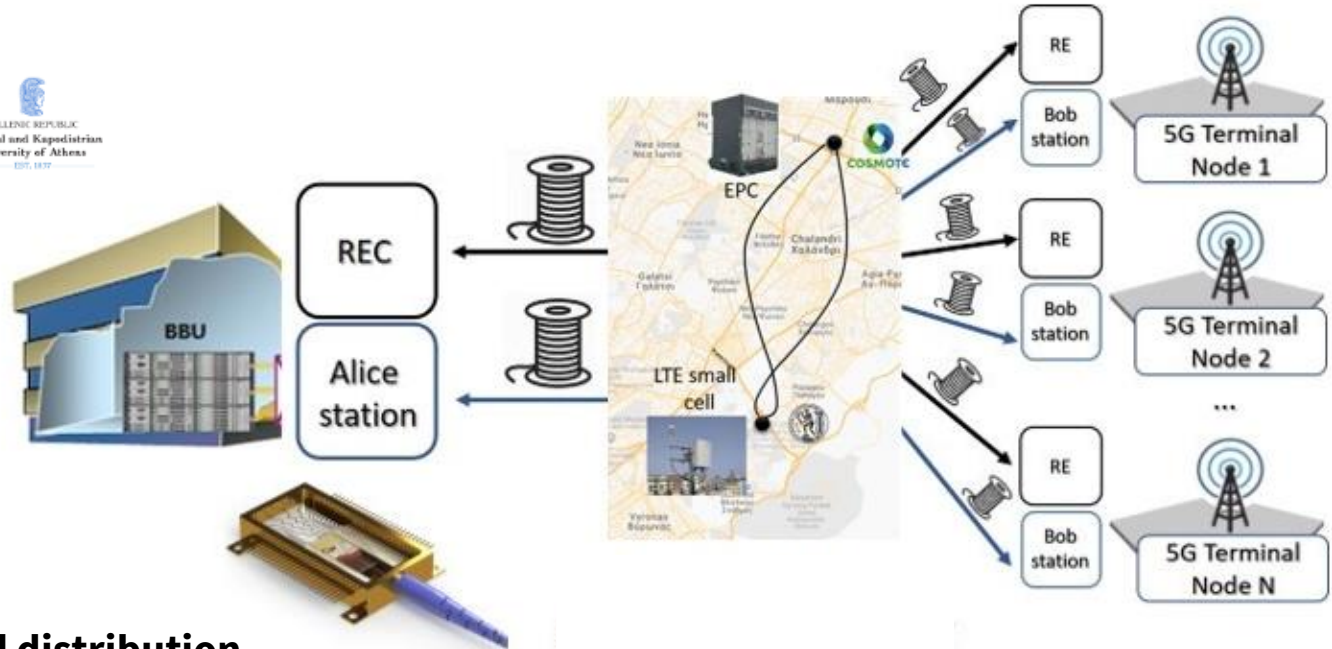
Quantum key encryption and distribution

QGOV

quantum-safe messaging and communication application

Towards the Quantum Internet

World-class Entanglement distribution in Greece

❑ **Entanglement** distribution and **quantum teleportation** is an essential element for the quantum internet

❑ HellaQCI will implement a state-of-the-art active entanglement distribution network using **cryogenic single photon detectors in NKUA** and **entanglement sources in ICCS/NTUA**

Thank you

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Any Questions?