PRODUCT DESCRIPTION

ATLAS

A toolkit by aegiq

ATLAS

Satellite quantum communication network cost and performance analysis.

A toolkit by Aegiq.

Practical cybersecurity in a post-quantum world needs satellites

- QKD satellite networks are necessary to ensure global cybersecurity and resilience against the threat of encryption-breaking quantum computers.
- Demonstrator missions, most prominently the Chinese Micius mission, have proven that the technology works.
- Accurate cost and performance analysis is needed to enable optimum quantum network implementation.

Quantum Key Distribution (QKD)

QKD is a method for two legitimate parties to generate a private encryption key between them free from eavesdropping by third parties.

The privacy of a key generated by QKD is guaranteed by the laws of physics, and if used with one-time pad encryption, impossible to crack.

Eliminate the guesswork from quantum satellite network design

The Atlas toolkit considers operational constraints, deployment costs, security and privacy, uptime, and maintenance requirements.. It provides simulation capabilities for satellite QKD and free space optical (FSO) networks through increasing layers of abstraction:

- Security and privacy informed from quantum mechanics first principles
- Hardware-specific single link performance analysis
- High level abstractions of network topology and wider performance metrics

Make informed decisions

Atlas addresses and offers clarity on multiple different perspectives of quantum network operation, from individual hardware choices to high level considerations such as number of satellites in a constellation.

Compute

- Time required to distribute keys on demand
- Time required to refresh global shared key database
- Secure bit rate of each link in the network

Compare

- Alternative quantum communication protocols
- Performance of classical and quantum hardware
- Atmospheric conditions at candidate ground sites

Inform

- Manufacturing and launch cost analyses
- Operations and lifecycle cost analyses
- Cost-benefit predictions and return on investment

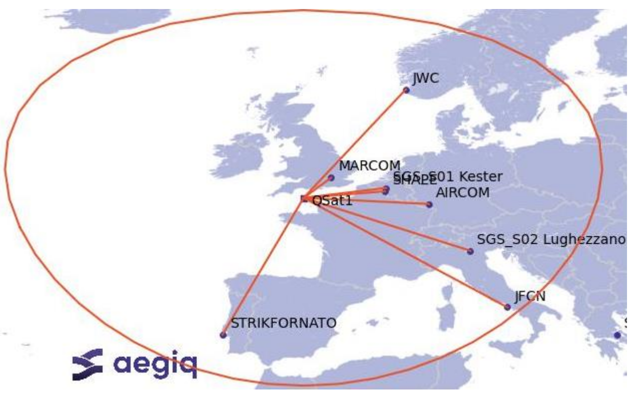
Optimise

- Number of satellites in the constellation and their orbital trajectories
- Topology of OGS locations
- Hardware and components for subsystem design

Analyse each layer of the satellite quantum protocol stack

Network Layer	**User outputs:** • End-to-end network route optimisation • Refresh and maintain global quantum-powered cryptography capacity • Network topology optimisation
Link Layer	**User outputs / services to Network Layer:** • Calculate link performance for real-life conditions and locations • Compute key generation rate and errors • Detect malicious activity by third parties
Physical Layer	**User inputs / services to Link Layer:** • Ground station coordinates and hardware • Number of satellites in constellation; their orbital trajectories and hardware specs • Apply defaults to unknown parameters

Visualise network capability



The free-space line of sight of a Low Earth Orbit satellite flying over western Europe, with links to ground stations highlighted

Visualisation of a Low Earth Orbit constellation of 9 satellites and their line of sight footprints as they traverse the globe