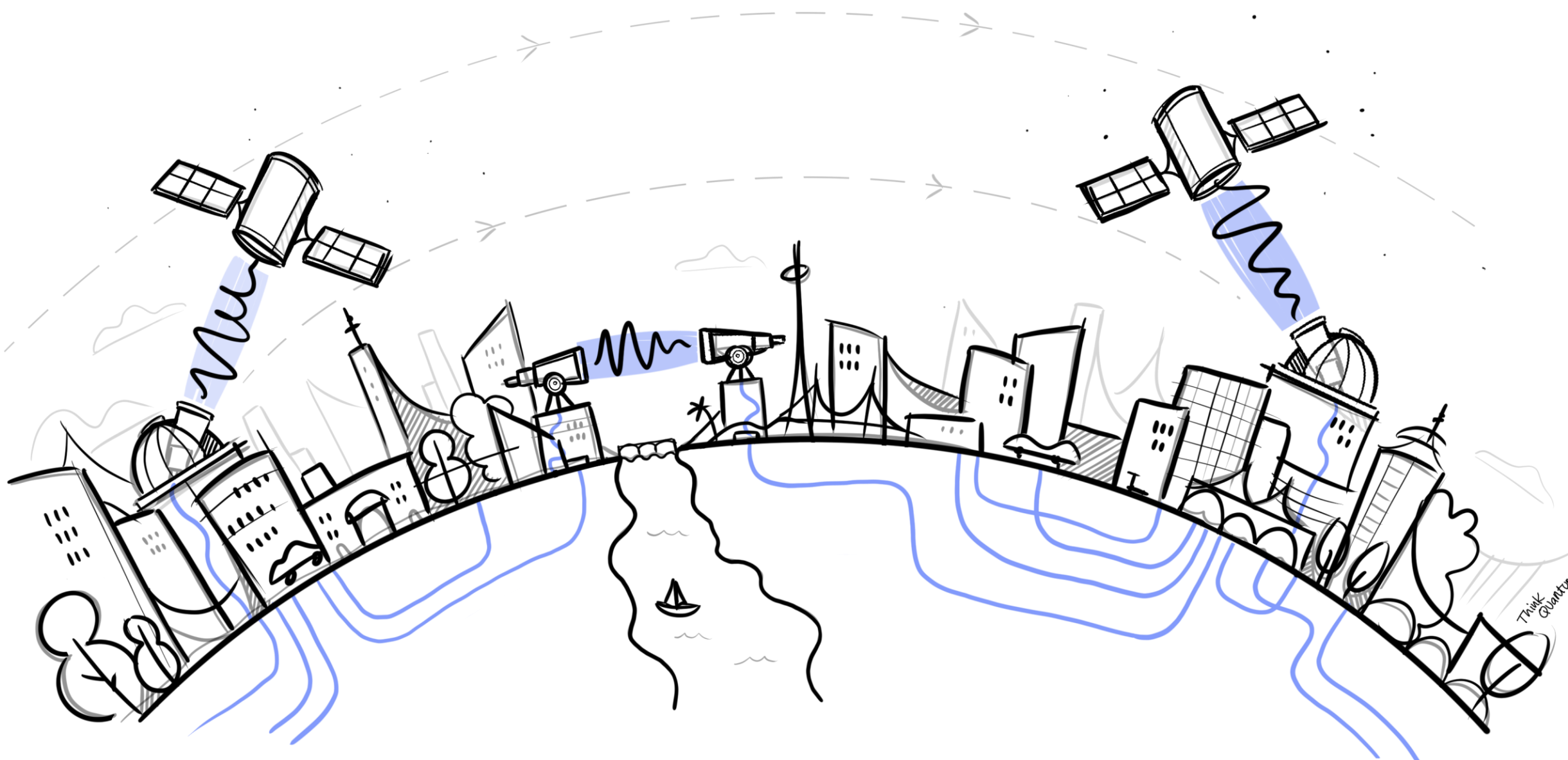
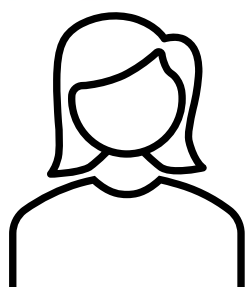


# Quantum Key Distribution System Volume Simulator QKD – SVS



FORUM CYBERS 4.0|  
Roma, 6-7 Giugno 2023

# LA CRITTOGRAFIA E LE COMUNICAZIONI QUANTISTICHE



Current cryptographic techniques security is based on computational complexity



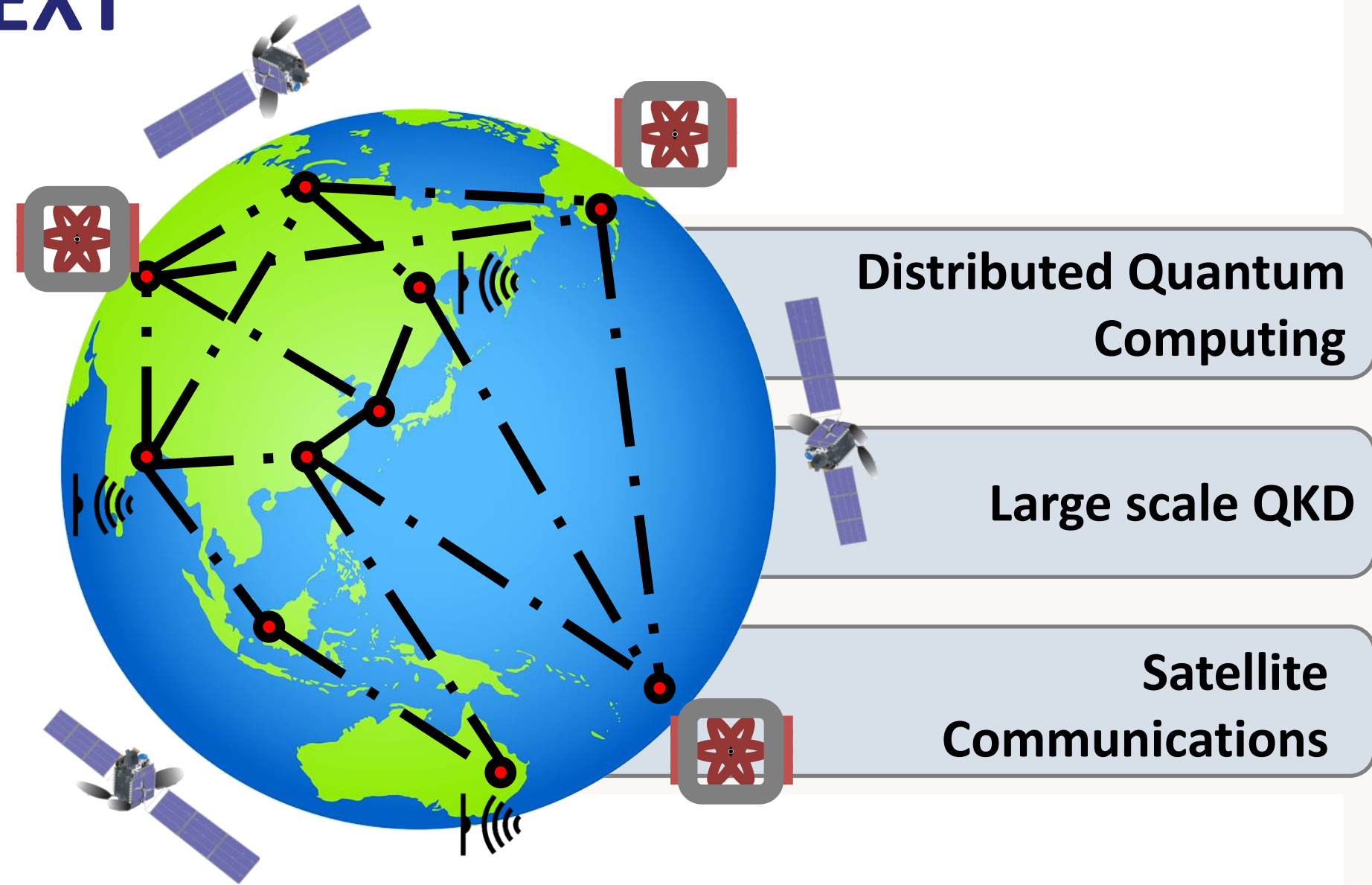
The development of mathematical techniques and the advent of quantum computers make current cryptographic methods vulnerable



Thanks to the maturity of quantum technologies, the distribution of the key can be achieved using the physical state of the photons, quantum properties allows to detect/identify attacks

**Quantum key distribution 'QKD'**

# CONTEXT

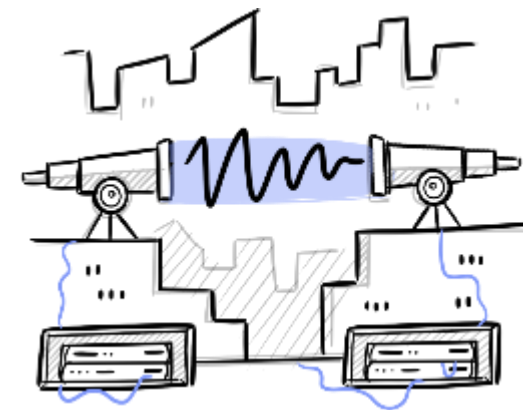


Q Comm Technologies

**SATELLITE LINK**



**FREE-SPACE  
OPTICAL LINK**



**FIBER-LINK**





# EUROPEAN QUANTUM TECHNOLOGIES FUNDING OPPORTUNITIES

HORIZON EUROPE  
2021-2027

RESEARCH BASED

HORIZON EUROPE

DIGITAL EUROPE  
DIGITAL SKILLS, CYBERSECURITY, SUPERCOMPUTING

INFRASTRUCTURES

DIGITAL EUROPE

Bring quantum technologies from the lab to the market and consolidate European scientific leadership in quantum research

- FUNDAMENTAL R&D
- TECHNOLOGY SUPPLY

ADVANCED DIGITAL SKILLS



Develop short term training courses and Master programmes in key capacity areas

QUANTUM COMMUNICATION INFRASTRUCTURE (EuroQCI)



Build and deploy in the next decade a certified secure pan-European end-to-end QCI for cybersecurity services

- QKD INFRASTRUCTURE
- TESTING OF CROSS-BORDER QCI LINKS

QUANTUM COMPUTING INFRASTRUCTURE (EuroHPC)

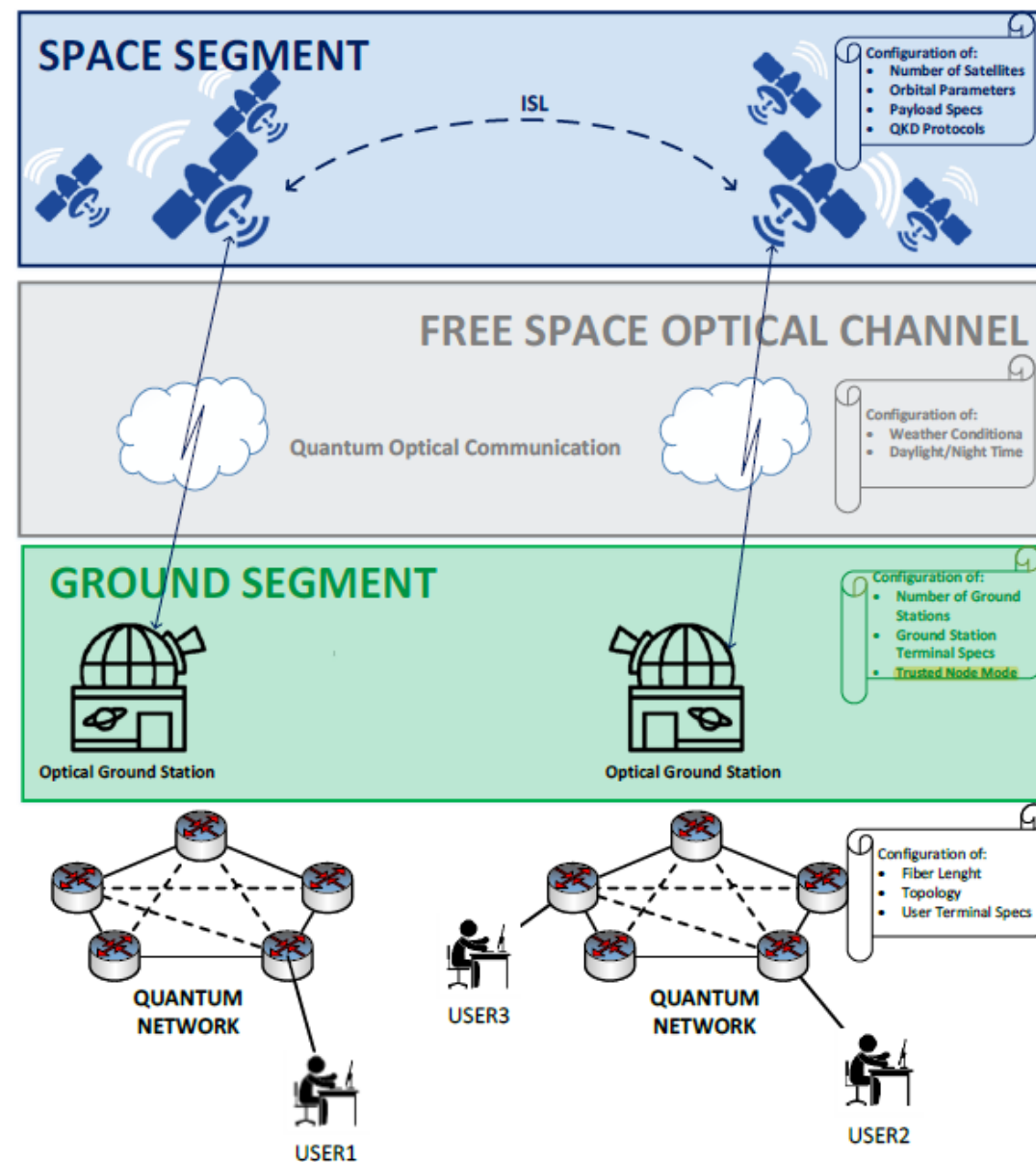


Build and deploy an infrastructure for big data, artificial intelligence, high performance computing, among others

- QT/HPC HYBRID
- QUANTUM SIMULATION/COMPUTATION

# QKD System Volume Simulator

A tool for simulating an **end-to-end space QKD service** connecting distant ground users by means of a space segment. It will help next generation QKD constellations design



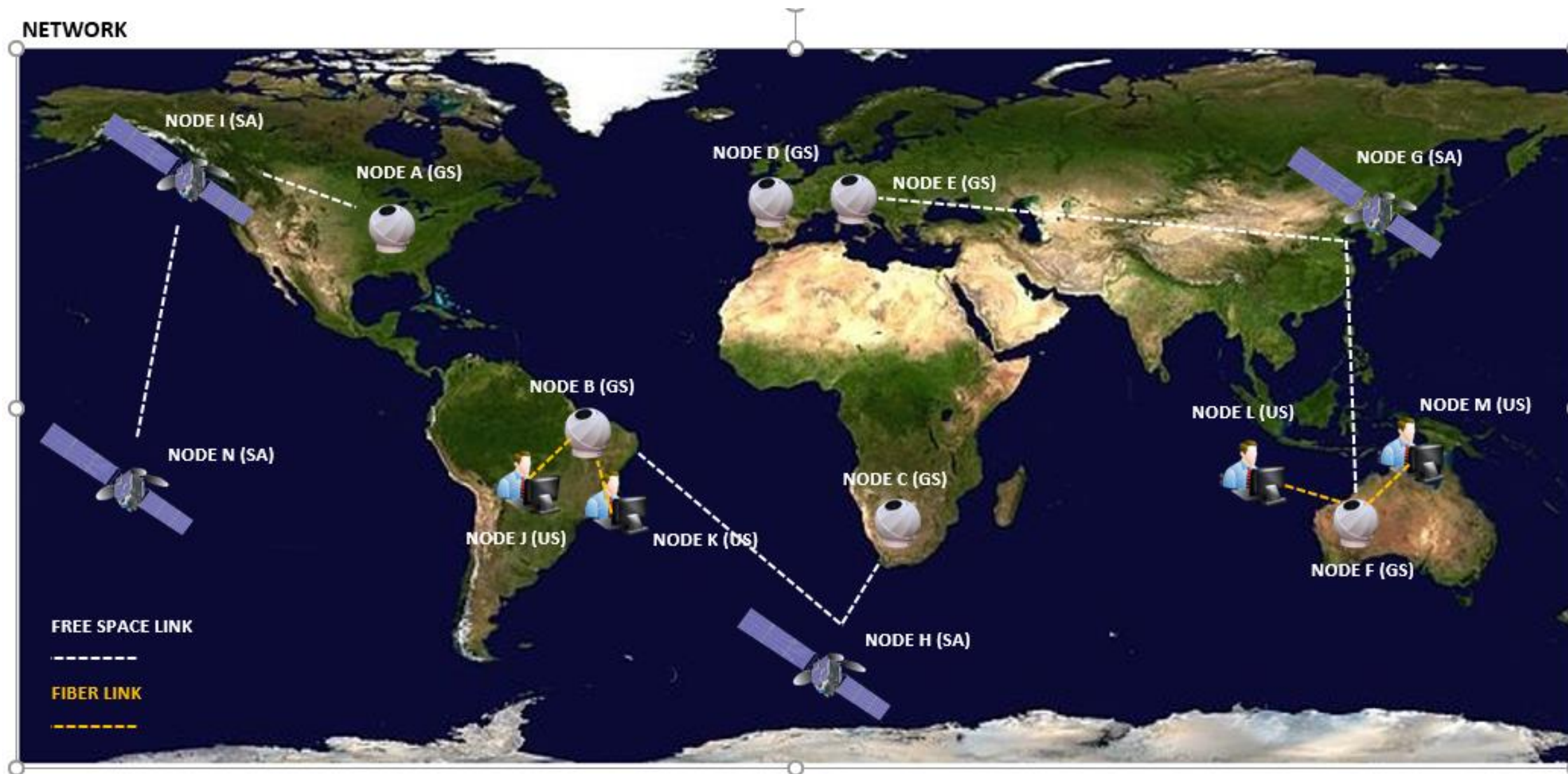
> Service simulation

> Highly configurable

> Performance analysis

> Resource optimization

# INFRASTRUCTURE & USE CASES

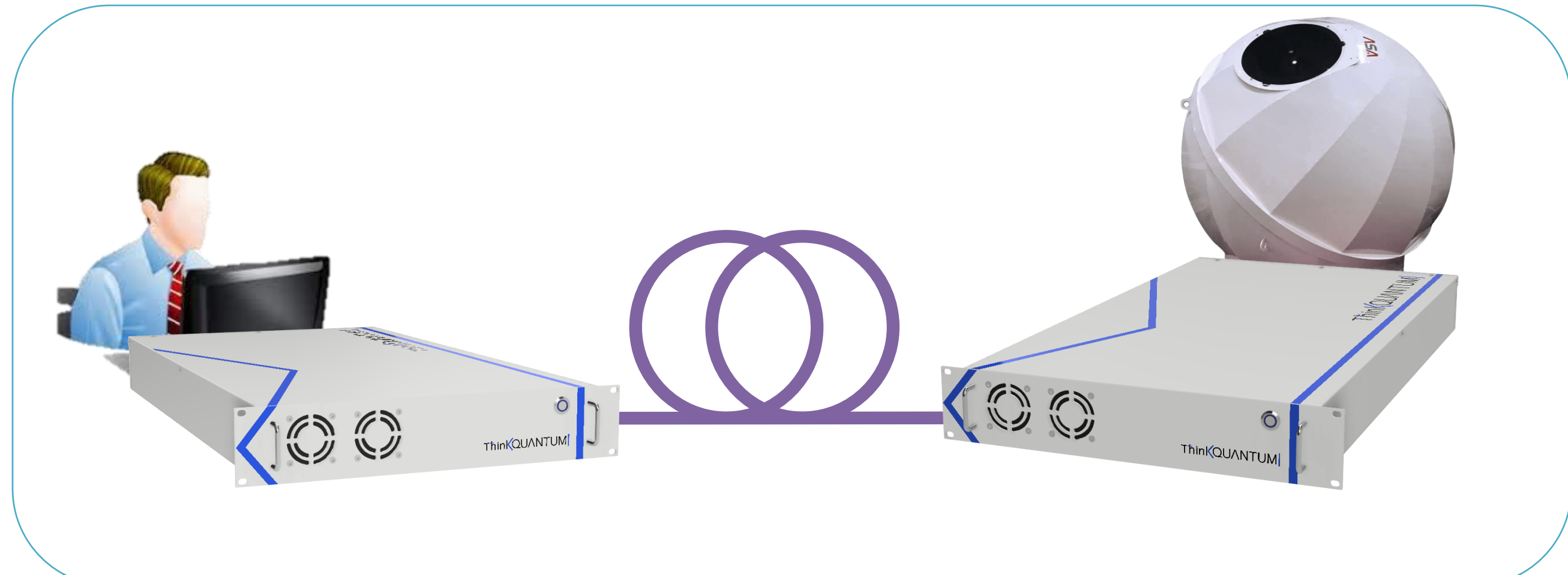


➤ Space links (ISL, TT&C ... )

➤ Secure time transfer

➤ Video \ audio conference

➤ Data centre interconnect



Among possible future expansions, QKD SVS will provide an «**hardware-in-the-loop**» feature for simulate a fiber-based QKD service between a User and a Ground Station

# QKD SVS STRUCTURE

**The user** will be able to:

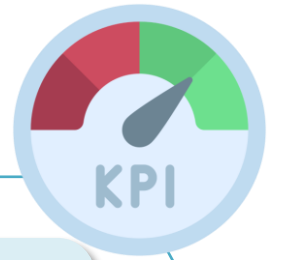
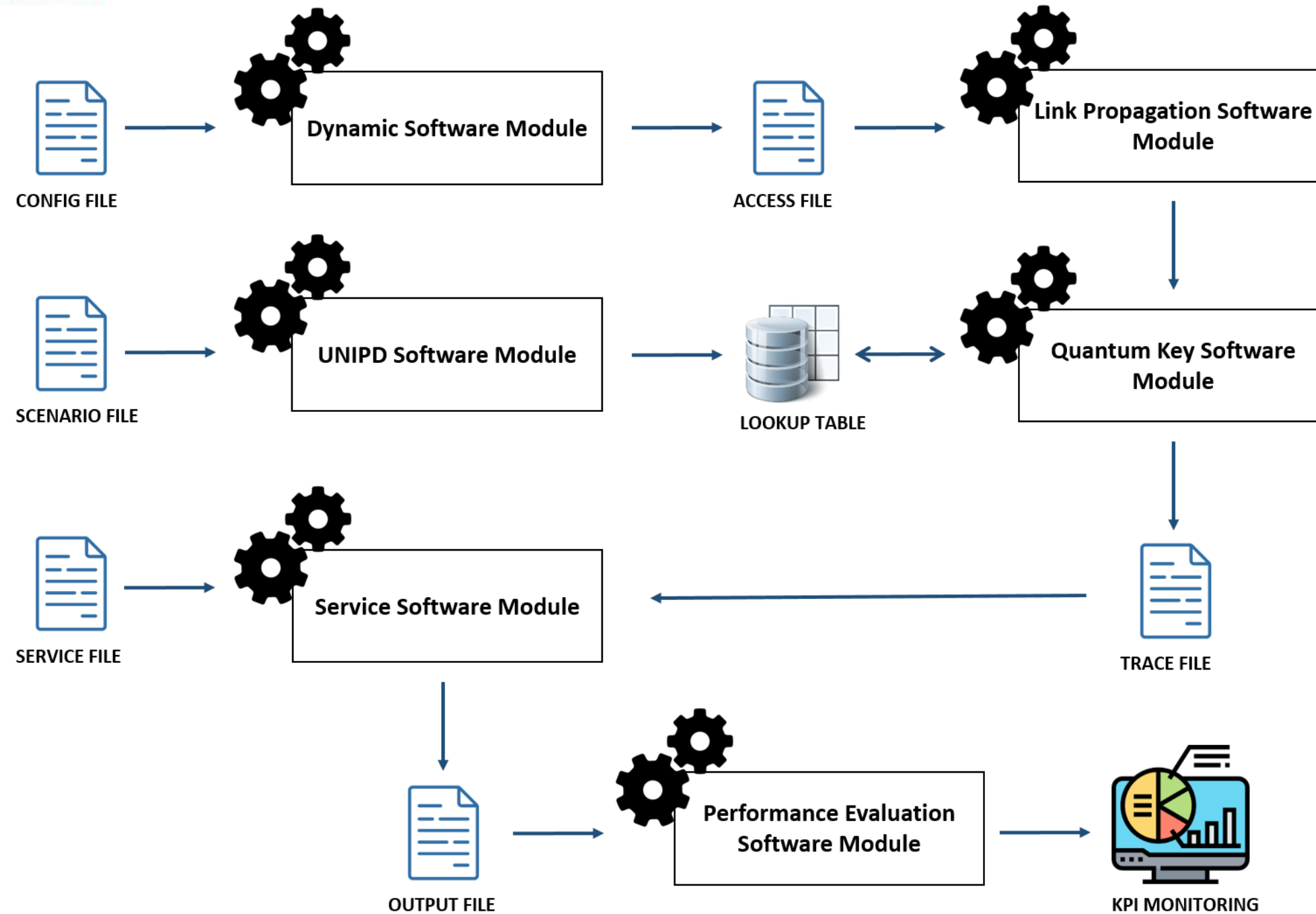
- **set up its network** (ground and space);
- choose a set of **services** to be tested.


A list of **use cases** has been identified in order to test and validate QKD SVS.

At the technological level, QKD can be applied to both **terrestrial, satellite or hybrid scenarios** (iwhere the data stream travels on the terrestrial network, satellite network, both of them)



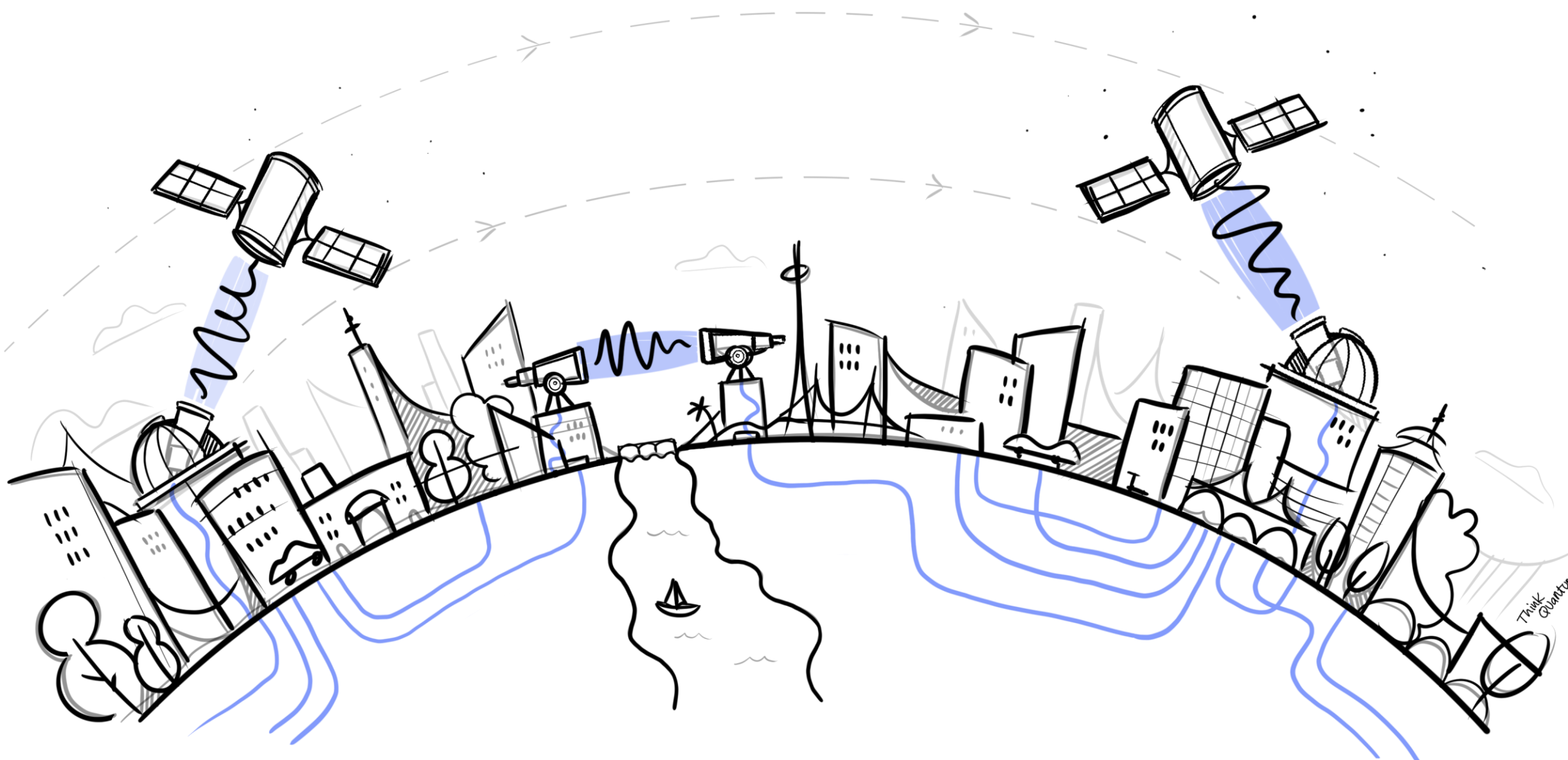
# QKD SVS STRUCTURE



-  **Global KPI**
-  **Application KPI**
-  **User KPI**

*A modular approach in the design to ease future expansion & maintenance*

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