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SecuWeb

Practical uses of SecuWeb Technologies

Secured data exchanges using quantum key distribution

Quantum technologies are enabling entirely new data sharing capabilities. In particular, the growing power of quantum computers could easily compromise some cryptographic methods currently used to secure data exchanges over the internet. In parallel, the emergence of quantum communication protocols will allow quantum systems to communicate with each other, paving the way for a new generation/paradigm of highly secure and high-performance digital infrastructures.

In the SecuWeb project, we are developing tools for encryption using quantum technologies and digital communication in the quantum internet. We are building a quantum memory operating directly in the range of existing fibered telecommunications. The quantum memory is based on lasers, quantum optics and ultracold atoms. It can be embedded in a quantum repeater that will be used to connect distant nodes of the quantum internet and interconnect quantum computers or distribute cryptographic keys with QKD (quantum key distribution) over distances longer than what is currently possible. The potential for fully secured data exchange and powerful computing is extremely promising, and developments are currently taking place in in the quantum lab in Louvain la Neuve (BE).

In parallel, we are developing an experimental platform to integrate advanced classical and quantum communication security into wireless, 5G-enabled, and fiber-based infrastructures. To support this effort, we are building a testbed - originally designed for emergency communication - to test performance, resilience, security, and operational impact under realistic deployment conditions. The platform combines network emulation, secure communication overlays, automated analysis, and experimental quantum-inspired key management approaches.
Building upon our experience in the development of quantum memories, our testbed is designed to be compatible with future quantum communication components and networks. The maturity of our communication and benchmarking framework is TRL 3-4, while the quantum integration layer is TRL 2.

Quantum internet is a future type of network that uses properties of quantum particles such as superposition (the possibility of a bit of information to be in a superposition of 0 and 1) to let devices exchange information in a fundamentally more secure way.

Quantum-memory device designed in the quantum lab at UCLouvain.

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