Exail Technologies participates in the QKISS project, aimed at developing European quantum cryptographic communication systems

The QKISS (*Quantum Key Industrial SystemS*) project aims at producing high-performance, secure and certifiable European Quantum Key Distribution (QKD) systems within 2 to 3 years. Funded by the European Commission, within the Digital Europe program, the project started in January 2023. It brings together two high-tech industrial groups, Exail and Thales, and two leading academic teams from Université Paris-Saclay[1] and Sorbonne Université[2].

The Quantum Communication Infrastructure initiative of the European Commission (EuroQCI) aims to build a secure quantum communication infrastructure that will span the whole EU, including its overseas territories. As an answer to the current lack of established QKD hardware suppliers to protect the EU strategic digital autonomy, QKISS's objective is to implement a complete and qualified telecom link that allows encrypted communications protected by the fundamental laws of physics, developed by French industrial and academic experts.

The project, led by Exail, leverages the extensive expertise of the 4 partners involved. It will include the manufacturing of opto-electronic components, the development of specialized signal processing and coding algorithms, and go up to full system integration and field demonstrations. QKISS will also produce field evidence of compatibility with telecom network systems, with the QKD systems functioning together with Mistral encryptors from Thales (a turnkey network encryption system including a centralized management software, adapted to the specific QKD framework).

Certifiability and compliance of the QKISS systems with EU standards will be included in the security analysis and the design strategy of the project at an early stage. To do so, limitation of attack surface, in-depth defense and common criteria evaluations for the protection profile will be considered. For this purpose, the design will feature a low number of external interfaces, a limited number of components for realistic system construction, an industrial architecture for legacy networks and use of QKD as an add-on to existing IT needs.

Baptiste Gouraud, R&D engineer and project manager for Exail, states: "*In practice, QKISS will consist in the implementation of a laser-telecom link between a transmitter called "AliX" and a receiver called "BeatriX" thanks to optical fibers. Using the same technique as in long-haul optical communications, information will be transmitted through coherent modulation of light: it will be encoded in the amplitude and phase of the electromagnetic field but will be protected by the quantum detection noise. Coherent homodyne or heterodyne detection will be used to retrieve the quadrature value of the signal to read the key into it. The communication will thus be fully encrypted and protected by the fundamental laws of physics.*"

"*Thales teams are eager to strengthen collaborations with partners within QKISS. The Group will contribute to meeting the high technical expectations of this project, by providing their expertise in specific signal processing for QKD, system design, security analysis and dedicated encryptors.*" adds Stéphanie Molin, R&D project leader at Thales.

According to Philippe Grangier, head of the Quantum Optic Group at the Institut d'Optique"*The QKISS project builds upon a long experience of academic research on continuous-variable quantum key distribution (CVQKD), starting with a highly-cited article published in 2003 (F. Grosshans and al., Nature, 421). After tremendous progress over the years, involving both academic and industry partners, the technology is now mature enough for industrial deployment.* "

"*QKISS leverages and builds on the important recent developments and synergies pursued in the QKD field in the context of EU-funded projects (for instance, CiViQ and OpenQKD)*", adds Eleni Diamanti, CNRS Senior Researcher and team leader at LIP6 lab, at Sorbonne Université.

The project targets a low-cost and high-rate implementation suitable for metro use-cases with very high speed of communication: modulation rate in hundreds of megabaud (MBd) and secure key rate in megabits per second (Mbit/s). After an industrialization phase, QKISS systems will be available for deployment in the EuroQCI and applications relying on private communications: e-banking, e-health, government communication or the management and protection of critical infrastructure.

logo of the QKISS project

[1] Team of Prof. Philippe Grangier at Institut d'Optique Graduate School
[2] Team of Dr. Eleni Diamanti at LIP6 laboratory (CNRS/Sorbonne Université)

About Exail Technologies

Exail Technologies is the new name of Groupe Gorgé, adopted after the transformation of the group at the end of 2022, now focused on the activities of its subsidiary Exail. Exail Technologies is an industrial company specializing in high technology in the field of autonomous robotics with a vertical integration of its businesses. The group offers complex drone and navigation systems, as well as products for the aerospace and photonics industries. Exail Technologies provides performance, reliability and safety to its civil and military customers operating in harsh environments and generates revenues in nearly 80 countries.

Exail technologies is listed on Euronext Paris Compartment B (EXA).
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