



TDB-DST signs agreement with QNu Labs for ₹150 crore RDI support to strengthen India's indigenous quantum-secure technology ecosystem

Project to advance a sovereign technology stack for India's Quantum Secure and Sensing Networks, targeting TRL-9

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In a significant step towards strengthening India's capabilities in quantum technologies and secure communications, the Technology Development Board (TDB), Department of Science & Technology (DST), Government of India, has signed an agreement with QNu Labs Private Limited, Bengaluru, Karnataka for financial support of ₹150 crore under the Research Development and Innovation (RDI) Fund.

The project, with a total cost of ₹300 crore, aims to develop an indigenous technology backbone for India's Quantum Secure and Sensing Networks (IQSN). The programme will advance a portfolio of technologies from Technology Readiness Levels (TRL) 4-5 towards TRL-9, supporting the development, integration and validation of a sovereign quantum-security and sensing technology stack. The financial support will be provided through Optionally Convertible Debt (OCD).

As digital infrastructure becomes increasingly interconnected, securing the authenticity of devices, the integrity of navigation systems, the reliability of time synchronisation and the confidentiality of communications is emerging as a critical technological priority. Quantum technologies offer new approaches to addressing these challenges, particularly in applications where conventional security mechanisms may face limitations from evolving cyber and technological threats. QNu Labs' proposed programme seeks to address these requirements through an integrated framework built around four pillars: identity security, location integrity, network security and time integrity. The programme brings together complementary capabilities to establish a unified foundation for sovereign security and sensing infrastructure.

Under the identity security pillar, the programme envisages quantum-secure physical unclonable functions (PUFs) and quantum-safe trusted platform modules (TPMs) to support hardware-based device identity, authentication and cryptographic security. These technologies are intended to strengthen trust at the device level and reduce vulnerabilities

associated with compromised or replicated identities. The location integrity pillar focuses on technologies designed to support trusted navigation and detect attempts to manipulate or spoof positioning systems. The proposed work includes compact quantum magnetometers for electromagnetic tampering detection and GPS-denied navigation capabilities, with potential applications in defence and other mission-critical platforms.

Under network security, the programme seeks to advance a quantum-secure communications ecosystem through chip-based quantum key distribution (QKD), satellite-based QKD and supporting technologies such as quantum-secure communication modules and encryption systems. The objective is to develop deployable capabilities for secure communications across terrestrial and long-distance networks.

The fourth pillar, time integrity, focuses on indigenous high-precision timing infrastructure, including atomic clock technology and secure time synchronisation using QKD-authenticated distribution. Reliable and tamper-resistant time synchronisation is essential for telecommunications, financial systems, critical infrastructure and defence applications. Together, these four pillars are intended to contribute to an integrated quantum trust framework supporting device authenticity, secure communications, trusted navigation and tamper-resistant timing. The programme will involve further research, engineering refinement, system integration and validation to progress the technologies towards higher levels of readiness and deployment.

Shri Rajesh Kumar Pathak, Secretary, TDB, said: *“Quantum technologies are opening new possibilities for addressing complex challenges in cybersecurity, communications, navigation and critical infrastructure. Building indigenous capabilities across these interconnected domains is important for strengthening India’s technological self-reliance and long-term security. Through the RDI Fund, TDB is supporting the development and maturation of advanced technologies that require sustained investment to progress from research and engineering to integrated, deployable systems.”*

Founder of QNu Labs Private Limited said: *“Quantum technologies will shape how nations protect their communications, devices, navigation and timing systems. TDB’s support under the RDI Fund allows us to accelerate our R&D roadmap beyond quantum security stack. Our work will focus on four connected areas: device identity, location integrity, network security and time integrity, so that trust is built into infrastructure from the hardware upwards. This programme extends quantum security foundation into chip-based and satellite-based QKD, quantum sensing and AI. We see this partnership as a responsibility: to deliver indigenous capabilities that India’s defence, telecom, financial and critical infrastructure sectors can rely on, and to strengthen the wider quantum ecosystem through collaboration with academia, startups and industry.”*



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