Terms of Reference (ToR) for ETSI TC Quantum Technologies (TC QT)
Approved at ETSI Board#154 (24-25 September 2025)

Scope

The main objectives of TC QT are:

- To develops deliverables[1] to support the deployment and operation of Quantum Technologies related solutions for Quantum Communications, Quantum Networks and other related fields of activity.

- To further differentiate the approach depending on the maturity level of the related focus areas. With some focus areas in the field of Quantum Technologies being in an early and exploratory stage of technological maturity, the focus is expected to be on developing studies and publishing related Technical Reports, White Papers, and similar materials. As the associated technologies mature, the TC focus more on publishing normative deliverables.

- To address European policy and regulatory requirements and prospective future Standardisation Requests addressed to ETSI.

- To engage with other regulatory bodies and specific treaty organisations to ensure that the output supports relevant global, regional, and national requirements.

- To provide input on the technical aspects of ETSI responses to EU Standardisation Requests and other government requests regarding Quantum Technologies solutions.

- To collaborate with open-source initiatives relevant to Quantum domain standardization, starting from relevant existing and future ETSI SDGs with reference implementations and interoperability testing specifications.

- To cooperate with other European and international standards organizations working on Quantum standardization to avoid duplication of work and promote alignment, through MoUs or Collaboration Agreements[2].

- To collaborate with the research ecosystem, especially the European Horizon Framework Programmes, to attract new concepts, expertise and knowledge to standardisation activities in ETSI.

Areas of Activity

The activities of **TC QT** include the following broad areas:

1. Quantum Technologies
   - Quantum communications leverage the principles of Quantum mechanics to enable secure and efficient information transfer. By utilizing phenomena such as superposition and entanglement, Quantum communications promise unparalleled security and transformative advancements in how data is transmitted and safeguarded in the digital age.
   - Quantum Networking focuses on connecting Quantum devices and systems to enable the sharing of Quantum information across distances. Quantum networking aims to support applications like distributed Quantum computing, Quantum cryptography, and advanced sensing.

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[1] For Information about the type of ETSI standards please refer to: https://www.etsi.org/standards/types-of-standards.
[2] For information about the different types of collaboration adopted in ETSI and current collaborations please refer to https://www.etsi.org/about/our-partnerships

- Quantum Sensing aims to achieve ultra-precise measurements (timing, synchronisation, physical quantities) only for quantum communication networks.
- Satellite Quantum Communications: a standardized approach to classical beacon signals—particularly in terms of wavelength specifications for uplink and downlink channels—could significantly streamline the deployment and interoperability of satellite-based QKD systems or other space-based Quantum Communication systems. In addition, standardization of the interfaces, protocols, and operational procedures for embedding KMS into OGSs is crucial. Furthermore, security and safety measurements of OGSs might be part of the common standards. Coordination with the European Cooperation for Space Standardization is essential.
- Quantum Random Number Generator (QRNG): QRNGs produce randomness derived from Quantum processes like photon detection or electron spin. This makes them ideal for applications requiring high levels of security and unpredictability, such as cryptography, simulations, and secure communications.
- Other Quantum technologies might be covered based on collaborations with other organisations and industry needs.

2. Quantum Security / hacking strategies
   - The area of focus is on experimental procedures that measure quantum communications, and specifically QKD vulnerabilities. In this regard, standardized methodologies to measure hardware parameters would facilitate quantum communications infrastructure deployment. It considers publications by institutions and government agencies.
   - Standardizing methodologies for assessing hardware vulnerabilities. This activity will require input from theoreticians with expertise in security proofs and physicists with knowledge in experimental quantum optics.
   - There is a need to establish methodologies for assessing hardware vulnerabilities, validating security proofs, verifying the correctness of model implementations, and evaluating susceptibility to side-channel attacks.

3. Future of quantum technologies
   - Development of new activities in quantum technologies tailored to industry needs.
   - Scope out new work areas that could arise around quantum technologies
   - Contribution to existing and new STFs for quantum technologies.

4. Addressing European Policy needs
   - The scope of ETSI standards is worldwide, but EuroQCI (European Quantum Communication Infrastructure) will be a strategic target for **TC QT**. A key objective is to establish strong connections with the relevant parts of the European Commission and all applicable European Quantum projects and initiatives.

Annex (Informative): Collaboration with other bodies

TC QT will set-up the appropriate communication channels to the following groups both within and outside of ETSI.

ETSI groups
- TC Cyber / QSC
- TC SES
- ISG QKD
- ISG F5G
- 3GPP
- Special Committee SAGE

External groups
- ECSS (European Cooperation for Space Standardization)
- CEN/CENELEC
- ISO
- IEC
- GSMA
- IETF
- ITU-T
- ITU-R
- IEEE
- NIST

TC QT seeks to reuse existing applicable standardisation work and will encourage existing groups to fulfil Quantum Technologies-related requirements. **TC QT** seeks to collaborate with other ETSI TGs to ensure the provision of complementary solutions. **TC QT** also seeks to collaborate with ETSI PP to assure complementary solutions with potential global applicability.

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