

Design and Implementation of a Distributed Quantum Key Management System for Three-Node QKD Systems

– Project & Thesis Topics for Students

1. Project Background

Quantum Key Distribution (QKD) is a core technology in the field of quantum communication, enabling theoretically unconditionally secure key distribution. However, with the rapid development of QKD technologies, quantum key management has become a critical research topic, especially in multi-node networks where key management faces challenges distinct from those in classical communication systems. This project aims to design and implement a distributed quantum key management system for three-node QKD systems, providing technical support for the future construction of quantum communication networks.

2. Project Objectives

- Investigate the challenges and existing solutions in quantum key management systems.
- Design and implement a distributed quantum key management system for three-node QKD systems.
- Address core issues such as key distribution, storage, updating, and security.
- Validate the system's functionality and performance through simulation or experimentation.

3. Research Content

1. Challenges and Existing Solutions in Quantum Key Management Systems:

- Study the core issues in quantum key generation, distribution, storage, and updating.
- Analyze the strengths and weaknesses of existing QKD key management solutions.

2. Design of a Distributed Quantum Key Management System:

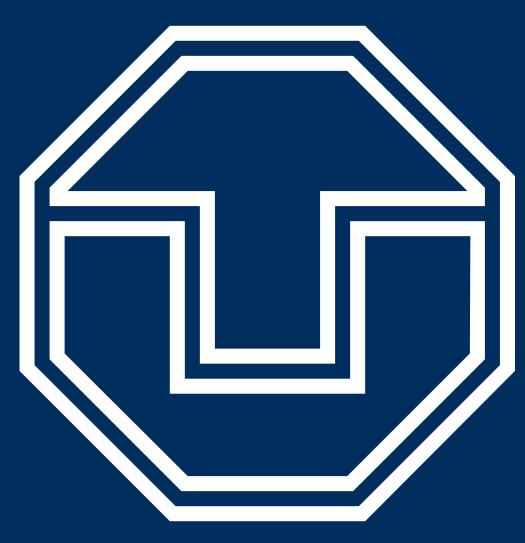
- Design the key management architecture for three-node QKD systems.
- Implement efficient key distribution and relaying mechanisms.
- Design secure key storage and updating schemes.

3. Security Assurance:

- Research quantum-resistant key management protocols.
- Implement security measures for key transmission and storage.

4. System Implementation and Testing:

- Implement the distributed quantum key management system.
- Validate the system's functionality and performance through simulation or experimentation.



4. Requirements for Applicants

1. Academic Background:

- Major in Computer Science, Electronic Engineering, Communication Engineering, or related fields.

2. Technical Skills:

- Familiarity with network communication protocols (e.g., TCP/IP, HTTP) and distributed systems.
- Proficiency in programming (e.g., Python, C++, Java).
- Database related knowledge is preferred.
- Experience in distributed systems or key management is a plus.

3. Attitude:

- Proactive, with strong learning ability and teamwork spirit.

Contact

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*Outstanding research results may be published in relevant academic journals or conferences.