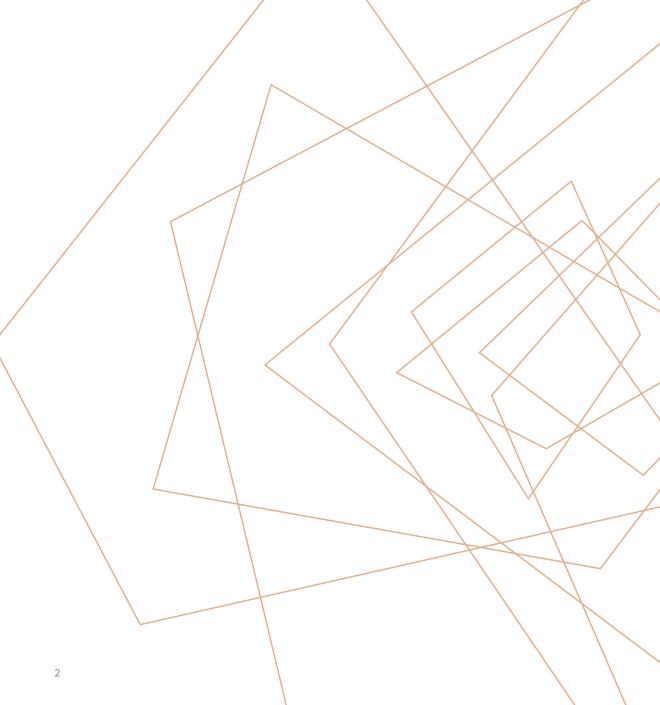


INTRODUCTION

- Quantum computers threaten traditional encryption systems (e.g., RSA).
- Full quantum security is difficult to implement on portable devices.
- Semi-Quantum Communication (SQC) allows secure communication using simpler quantum capabilities.
- EKSQPC offers a lightweight and efficient solution for secure quantum communication.



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BACKGROUND -QUANTUM & SEMI-QUANTUM COMMUNICATION

Quantum Key Distribution (QKD)

enables secure communication but requires full quantum devices.

Semi-Quantum Communication (SQC)

allows **one party to use a classical device** while still ensuring security.

EKSQPC

overcomes these limitations with a more efficient approach.

Previous SQC protocols

- Low efficiency (many qubits wasted).
- Long entanglement holding time (impractical in real-world use).

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PROPOSED SOLUTION - EKSQPC & REKSQPC

EKSQPC reduces **entanglement preservation time** and **hardware complexity**

Uses **Tele-Fetch** operation to **extract information** without direct transmission.

Implements Measure and Replay Attack
Detection (MRAD) to detect attackers.

REKSQPC improves security by considering **real-** world noise and disturbances.

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STE	P 1		Create entangled EPR pairs.
	STEP 2		Simulate Bob's choices: measure or reflect qubits.
	STEP	3	Implement Tele-Fetch operation.
		STEP 4	Implement Measure and Replay Attack Detection (MRAD)

IMPLEMENTATION PLAN (MATLAB)

EXPECTED RESULTS & CHALLENGES

Results

- Secure quantum message transmission using EKSQPC.
- Detect hacking attempts using MRAD.
- High qubit efficiency (approaching 100%).

Challenges

- Simulating quantum behavior in MATLAB.
- Understanding and implementing Bell measurements.
- Handling real-world noise in REKSQPC.

MARCH 1 -7	 Research & Initial Set up Finalize research on Tele-Fetch (TF), MRAD, and Bell Measurements. Set up MATLAB and install necessary quantum simulation libraries. Define the project structure and initial code framework.
MARCH 8 - 14	Implement Core Functions (EKSQPC) Implement EPR pair generation and Bell measurements in MATLAB. Implement Bob's measurement/reflection process. Implement Tele-Fetch (TF) function to infer Bob's results.
MARCH 15 - 21	Implement REKSQPC & Attack Simulations Introduce probing bits and simulate Measure and Replay Attack (MRA). Implement MRAD (MRA Detection) in MATLAB. Extend EKSQPC to REKSQPC, adding statistical estimation for noise (optional).
MARCH 22 - 31	Testing, Optimization & Final Report O Run full-scale testing with multiple message transmissions. Optimize qubit efficiency & reduce runtime issues.

EXECUTION PLAN

Document results, challenges, and improvements.

ALIGNMENT

- EKSQPC and REKSQPC provide an efficient and secure approach to semi-quantum communication.
- Our project will implement and test these protocols in MATLAB.
- o The findings will **demonstrate feasibility and security**.
- Future work could explore **hardware implementations** for realworld use.

REFERENCES

Lu, H., Barbeau, M., & Nayak, A. (2019, January 11). Keyless semi-quantum point-to-point communication protocol with low resource requirements. Nature News. https://www.nature.com/articles/s41598-018-37045-0