

Post Quantum Cryptography Enabled SRT and gRPC

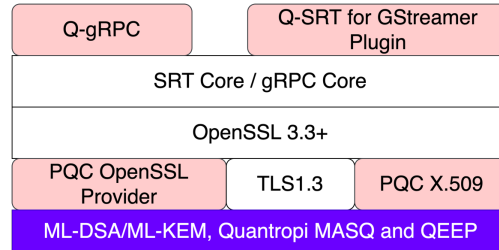
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Introduction

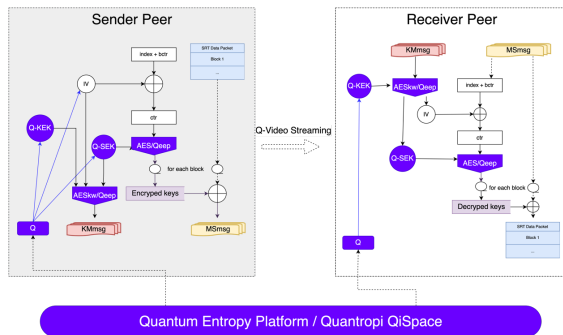
Secure Reliable Transport (SRT) and gRPC are widely deployed communication technologies for video streaming and distributed systems. However, their current security mechanisms rely on classical public-key cryptography, which may become vulnerable to future quantum computers.

This work investigates the integration of Post-Quantum Cryptography (PQC) into both SRT and gRPC, creating Q-SRT and Q-gRPC frameworks. Our approach enables the adoption of NIST-standardized PQC algorithms, including ML-KEM and ML-DSA, as well as Quantropi technologies such as MASQ™, QEEP™, and Quantum Entropy services, while preserving existing application interfaces.

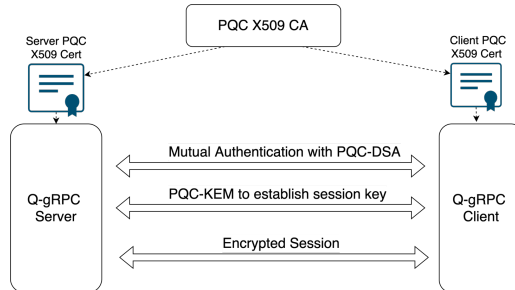
Q Build Framework



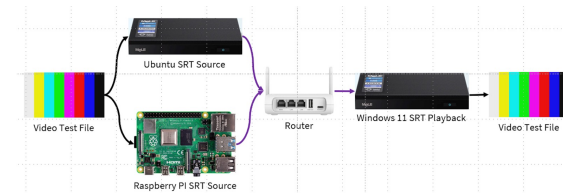
Q-SRT



Q-gRPC



Q-SRT Video Streaming Experiment



SRT Performance Results with 10% packet loss



	Sender Average latency (ms)	Receive Average latency (ms)
AES-256-ctr	563057.21	651135.92
QEEP-256-ctr	305403.23	342869.05
AES/QEEP	1.84	1.90

Q-gRPC for Quantropi Quantum Entropy Evaluation



QE Distribution Speed/1 Thread for Quside and Qlab source

gRPC Client Number	1	3	5	8	10
Quside QE (Mbps)	40.0521	14.0311	8.41822	5.24962	2.79049
Qlab QE (Mbps)	88.2968	33.2779	19.9681	12.4797	9.98403

Key Contributions

- OpenSSL 3.5 provider-based integration architecture for SRT and gRPC
- Support for ML-KEM, ML-DSA, MASQ™, and QEEP™
- Quantum entropy integration for key generation and salts
- Evaluation of security, performance, and deployment impact

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