Final Metrics Summary - BB84 Quantum Encryption System

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1. Quantum Key Distribution (BB84) Summary

Metric	AES-GCM	ChaCha20
Key A Length	128	120
Key B Length	124	114
Key B (1s count)	64	56
Key B (0s count)	60	58
A/B Match %	100.0	100.0
Error Rate	0.0	0.0
Shannon Entropy	1.0	0.9968
Key Confirmation	Passed	Passed

2. Encryption Performance Summary

Metric	AES-GCM	ChaCha20
Timestamp	2025-12-09 22:22:23.836743	2025-12-09 22:22:52.536598
Encryption Time (s)	3.1586	2.9796
Original File Size (bytes)	1610187	1610187
Encrypted File Size (bytes)	2872362	2872363
SHA-256 Hash	e4940d7955008eb3f174...	f09e1ba703c0955e0fd7...
Post-Quantum Signature	Enabled	Enabled

Interpretation:

+ ChaCha20 was 5.7% faster than AES-GCM in encryption

+ Both produced similar encrypted file sizes

+ Post-quantum Dilithium5 signatures protect against quantum attacks

3. Decryption Performance Summary

Metric	AES-GCM	ChaCha20
Timestamp	2025-12-09 22:23:24.674163	2025-12-09 22:23:52.680101
Decryption Time (s)	0.1621	0.1498
AEAD Authentication	Passed	Passed
Decrypted File Size (bytes)	1610187	1610187
SHA-256 Hash	48a0a8e2b222d8881c56...	48a0a8e2b222d8881c56...

Interpretation:

+ VERIFICATION PASSED: Both ciphers decrypted to identical files

+ ChaCha20 was 7.6% faster than AES-GCM in decryption

+ AEAD authentication prevents tampering and ensures data integrity

+ Both ciphers provide equivalent 256-bit security strength