

Final Metrics Summary - BB84 Quantum Encryption System

Generated: 2025-12-10 03:31:06

1. Quantum Key Distribution (BB84) Summary

Metric	AES-GCM	ChaCha20
Key A Length	112	104
Key B Length	108	98
Key B (1s count)	45	51
Key B (0s count)	63	47
A/B Match %	100.0	100.0
Error Rate	0.0	0.0
Shannon Entropy	0.972	0.9997
Key Confirmation	Passed	Passed

2. Encryption Performance Summary

Metric	AES-GCM	ChaCha20
Timestamp	2025-12-09 22:29:14.781836	2025-12-09 22:29:39.105571
Encryption Time (s)	0.7103	0.7856
Original File Size (bytes)	134	134
Encrypted File Size (bytes)	10057	10058
SHA-256 Hash	62313e161f9fc80ddaba...	cc73f6ad484e55139407...
Post-Quantum Signature	Enabled	Enabled

Interpretation:

- + AES-GCM was 9.6% faster than ChaCha20 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 22:30:27.951267	2025-12-09 22:30:04.883441
Decryption Time (s)	0.0643	0.0635
AEAD Authentication	Passed	Passed
Decrypted File Size (bytes)	134	134
SHA-256 Hash	f086bb687ef72cf98ee5...	f086bb687ef72cf98ee5...

Interpretation:

- + VERIFICATION PASSED: Both ciphers decrypted to identical files
- + ChaCha20 was 1.2% faster than AES-GCM in decryption

- + AEAD authentication prevents tampering and ensures data integrity
- + Both ciphers provide equivalent 256-bit security strength