Final Metrics Summary - Long word document

1. Quantum Key Distribution (BB84) Summary

Metric	AES-GCM	ChaCha20	AES-SIV
Key A Length	104	120	144
Key B Length	103	117	139
Key B (1s count)	46	48	62
Key B (0s count)	57	69	77
A/B Match %	100.0	100.0	100.0
Error Rate	0.0	0.0	0.0
Shannon Entropy	0.9904	0.971	0.986
Key Confirmation	Passed	Passed	Passed

2. Encryption Performance Summary

Metric	AES-GCM	ChaCha20	AES-SIV
Timestamp	2025-12-09 21:30:21.360499	2025-12-09 21:31:43.758058	2025-12-12 19:09:31.109453
Encryption Time (s)	0.7901	0.7047	0.7369
Original File Size (bytes)	37730	37730	37730
Encrypted File Size (bytes)	76896	76897	76880
SHA-256 Hash	045b2a2ae9268f01a74c...	ed1252d9338ed2221e83...	f41bf2f98692f58650be...
Post-Quantum Signature	Enabled	Enabled	Enabled

Interpretation:

+ ChaCha20 was 10.8% faster than AES-GCM in encryption

+ AES-SIV was 6.7% 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	AES-SIV
Timestamp	2025-12-09 21:31:00.789941	2025-12-09 21:32:18.339835	2025-12-12 19:09:57.687178
Decryption Time (s)	0.0724	0.0909	0.0957
AEAD Authentication	Passed	Passed	Passed
Decrypted File Size (bytes)	37730	37730	37730
SHA-256 Hash	32780b3fca0ec880d2a2...	32780b3fca0ec880d2a2...	32780b3fca0ec880d2a2...

Interpretation:

+ VERIFICATION PASSED: Both ciphers decrypted to identical files

+ AES-GCM was 20.4% faster than ChaCha20 in decryption
+ AES-GCM was 24.3% faster than AES-SIV in decryption
+ AEAD authentication prevents tampering and ensures data integrity
+ Both ciphers provide equivalent 256-bit security strength