

ALGORITHM VULNERABILITY ASSESSMENT

Algorithm type	Algorithms	Vulnerability in post quantum era	Justification
symmetric algorithm	Advanced Encryption Standard(AES)	None	Quantum computer on Grover's algorithm with clock rate of 2THz would take a million years to break AES-128 (JimakosJimakos, 2024).
	Twofish	None	Safer as it supports only 256 bit and not vulnerable to brute force.
	Serpent	None	High security margin only second to AES.
	Data Encryption Standard (DES)	None, Outdated	Uses 56-bit key (Grabbe, 2022).
	Blowfish	None	Can take up to 448 bits.
	Secure Hashing algorithm (SHA)	None	Uses 256 bits hashing algorithm against collision vulnerabilities and brute force attacks (Harish, 2024).
Asymmetric algorithm	Rivest Shamir Adleman (RSA)	Vulnerable	Susceptible to big enough quantum computer that uses qubits.
	Elliptic Curve Cryptography (ECDSA, ECDH)	Vulnerable	Quantum computers can solve ECDLP efficiently (EXPERIMENTAL, 2024).
	Finite Field Cryptography (DSA)	Vulnerable	Quantum computational ability can crack it in days if not hours.

References

JimakosJimakos 75511 gold badge55 silver badges1111 bronze badges, Daniel SDaniel S 24.7k11 gold badge2929 silver badges6767 bronze badges and PrinceofmillerovoPrinceofmillerovo 1522 bronze badges (2024) *Is AES-128 quantum safe?*, *Cryptography Stack Exchange*. Available at: <https://crypto.stackexchange.com/questions/102671/is-aes-128-quantum-safe> (Accessed: 26 August 2024).

Grabbe, J.O. (2022) *The des algorithm illustrated, The DES algorithm Illustrated*. Available at: <https://page.math.tu-berlin.de/~kant/teaching/hess/krypto-ws2006/des.htm> (Accessed: 25 August 2024).

Harish, A. (2024) *2024 complete guide to sha encryption types*, *SecureW2*. Available at: <https://www.securew2.com/blog/what-is-sha-encryption-sha-256-vs-sha-1#:~:text=SHA%2D256%20is%20secure%20due,a%20more%20secure%20hashing%20algorithm.> (Accessed: 26 August 2024).

ExperiMENTAL (2024) *Does quantum computing spell the end for elliptic curve cryptography? not quite!*, *Medium*. Available at: <https://medium.com/@jamie.brian.gilchrist/does-quantum-computing-spell-the-end-for-elliptic-curve-cryptography-not-quite-6f22ee202851#:~:text=The%20Quantum%20Threat%20to%20ECC&text=These%20advanced%20machines%2C%20armed%20with,Curve%20isn't%20sufficient%20anymore.> (Accessed: 26 August 2024).