Fiber optic communication encryption technology includes

Article Overview

Fiber optic communication encryption secures data in transit by combining physical layer protections with optical encryption and key distribution, ensuring high-speed, tamper-resistant transmission.

Physical Layer Security

Fiber optic cables inherently offer strong protection against electromagnetic eavesdropping because they do not radiate signals and are immune to electromagnetic interference, making passive interception difficult . However, attackers can still attempt physical taps using micro-bends or by accessing unsecured junctions, which can leak light signals and allow data capture . To mitigate this, hardened and bend-insensitive fibers (e.g., G.657.A2) are deployed to reduce light leakage and prevent unauthorized interception .

Optical Encryption Techniques

Optical encryption transforms data into cipher text directly within the optical domain, providing low-latency, high-speed security without compromising transmission rates . Common methods include:

• Optical XOR operations integrated into optical CDMA systems for encryption and decryption .
• Optical key distribution, which establishes secure keys over separate channels to...

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