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Secure Optical Communication System Using Quantum Cryptography

Authors : Ehab AbdulRazzaq Hussein

Abstract : Quantum cryptography (QC) is an emerging technology for secure key distribution with single-photon transmissions. In contrast to classical cryptographic schemes, the security of QC schemes is guaranteed by the fundamental laws of nature. Their security stems from the impossibility to distinguish non-orthogonal quantum states with certainty. A potential eavesdropper introduces errors in the transmissions, which can later be discovered by the legitimate participants of the communication. In this paper, the modeling approach is proposed for QC protocol BB84 using polarization coding. The single-photon system is assumed to be used in the designed models. Thus, Eve cannot use beam-splitting strategy to eavesdrop on the quantum channel transmission. The only eavesdropping strategy possible to Eve is the intercept/resend strategy. After quantum transmission of the QC protocol, the quantum bit error rate (QBER) is estimated and compared with a threshold value. If it is above this value the procedure must be stopped and performed later again.

Keywords : security, key distribution, cryptography, quantum protocols, Quantum Cryptography (QC), Quantum Key Distribution (QKD).
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