

SELECTED TOPICS IN ADVANCED ELECTRONICS

Edited by
Khalid A. S. Al-Khateeb



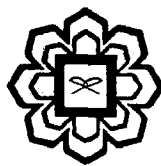
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CHAPTER 8

QUANTUM KEY DISTRIBUTION PROTOCOLS

By

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Synopsis

The Quantum Key Distribution method, which was proposed by Bennett and Brassard, is known as BB84. The BB84 and its variants use quantum bits in one pass and this is followed by two additional passes of classical data transmission. This method involves potential weak links. Kak's protocol, on the other hand, uses quantum information transmission in all its steps to ensure that there is no weak link in the process. The weakness of the classical data links of the BB84 is apparent from the fact that single photons are not easy to produce, and the duplicate photons can be used by the eavesdropper to reconstruct the key.

1. Introduction

In this section the most popular quantum cryptography protocols will be discussed. This includes Bennett and Brassard's BB84 protocol [9], B92 protocol [10]. In 1984, Bennett and Brassard published their BB84 protocol, which is now most popular. The BB84 QKD protocol can be generally stated as follows:

1. Alice chooses a random $(4 + \delta)n$ data bits.
2. Alice or the sender first chooses a random $(4 + \delta)n$ bit string and encodes each data bit as $\{|0\rangle, |1\rangle\}$, if the corresponding bit of the string is 0 or $\{|+\rangle, |-\rangle\}$ if the bit is 1.