

SELECTED TOPICS IN ADVANCED ELECTRONICS

Edited by
Khalid A. S. Al-Khateeb



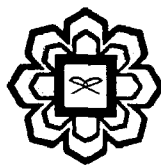
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ADVANCED ELECTRONICS

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CHAPTER 12

SECURITY PERFORMANCE OF QKD

By

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Synopsis

The goal of quantum key distribution (QKD) is to enable two distant parties, conventionally called *Alice* and *Bob*, to establish a common *secret key*, which is a string of random bits, which are unknown to an adversary, *Eve*. The most important difference between QKD and classical key distribution (CKD) schemes is that the security of the final key of the QKD can actually be proven. The number of logical assumptions that have to be made is very limited. The strong reasoning that backs the notion of *unconditional security* is the guarantee that an adversary does not get any information correlated with the key, except with negligible probability. A weaker level of security is computational security, which is difficult to break i.e. time-consuming, but not impossible. This kind of security is typically sought-after in classical cryptographic algorithms.

1. Introduction

With the huge revolution in the speed and computational capacity, if *Alice* and *Bob* are connected by a classical authenticated communication channel alone, secret communication and thus the generation of a secret key is impossible [25]. This changes dramatically when quantum mechanics form the basis for the security scheme. Bennett and Brassard were the first to introduce a quantum key distribution scheme, which uses a