2-Layer Security System for Hiding Sensitive Text Data on Personal Computers

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Abstract—High security system suitable to hide sensitive text-data on personal computer is proposed and implemented. The system hiding techniques involves AES cryptography followed by image based steganography as two layers to insure high security. The study involved several tests to increase the capacity within the steganography layer adopting 1 and 2 least significant bits stego methods. The study also explores the data dependency and its security effects by experimenting it on 30 different fixed size images showing interesting attractive results.

Index Terms—security for personal computer, AES cryptography, image base steganography, hiding text on PC.

I. INTRODUCTION

Hiding sensitive secret text within personal computers (PC) has privilege of the ability to utilize some of the PC available files to act as the cover media. Interestingly choosing among personal images can be assumed fully trusted confidential and only known by the PC user. This trust to hide within PC images played as real application behind image based steganography to secure sensitive text data. However, the security of the cover media, i.e. images on the PC, is based on the trust that the PC data cannot be penetrated by any means, which is difficult to assure and claim that the images are fully safe. This claim justified the need to add another security layer to insure that even for the very difficult security penetration; still the sensitive data are not harmed or used negatively. In other words, securing the data by steganography alone cannot be justified and completely relayed on, making the need to add another security layer [1]. We in this paper, present the 2-layer security system utilizing image base steganography as PC dependant layer as well as AES cryptography as independent assurance layer.

2-layers security system, i.e. cryptography layer and steganography layer are the main hiding techniques, used to insure full protection [2] of the sensitive information on a PC. Several sensitive text data examples can be expressed as clear application of our proposed system such as e-mail messages, credit card information, corporate data, etc. Steganography, as one of the layer’s hiding techniques, is derived from the Greek words stegos meaning “cover” and grafia meaning “writing” defining it as covered writing” [3]. Steganography, in general, uses any cover object of media types, i.e. text, image, audio and videos, to hide the secret data in it. After combining the secret with the cover object (making it PC dependant), the resulted file is known as the stego media.

Cryptography, as the other layer within this security system, is PC independent and completely deferent than steganography. Cryptography is mainly encrypting the secret plain text converting it to cipher text. Cryptography normally requires a secret key for the encryption/decryption process to secure the sensitive data from the third party. In our security system, the sensitive text data passes through the crypto layer involving a security key, followed by the steganography layer resulting the output file as Stego-Image. Figure 1 shows the main overview of the method using the two layer techniques [4].

In fact, steganography and cryptography are completely different [5]. In steganography, the sensitive text message is there, but nobody notices it or even aware that it exist [6]. However, once noticed, it can be read. Cryptography, on the other hand, is secret writing. Anybody can see the encrypted sensitive message, but nobody else than intended ones can read it. Usually, crypto-methods works on the sensitive text letters to be re-arranged, or replaced by different letters, according to