# ENHANCING NETWORK SECURITY USING CRYPTOGRAPHY AND STEGANOGRAPHY

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## Abstract

**Nowadays, communication is very important and developed a lot. In digital communication it's important to secure the transmitted information and data between sender and receiver. In this research, we present network security techniques to protect networks using cryptography and steganography in Oman. We are discussing about the network security to transfer the data using cryptography algorithm. In addition, steganography techniques also apply for the network protection to enhance the security.**

Keywords: Cryptography, Steganography, Protection

## I. INTRODUCTION

Day by day, the networks spread fast in the world. Then these networks need protection to secure all the information in networked computers. Network security is access protection of the files and directories in a computer network. Data transmission through the network devices should be protected by assigning user authenticating. Network security have both public and private computer networks, which are daily used in jobs transactions and communications for business, government and individuals. Cryptography is that the methodology of secure transmission of information by converting the text into some disgusted form so that only the intended user can remove that disgust and can read the original secret message. It is a way to change data to unreadable format for an illegal user. The encrypted information cannot be read without a key. Although, steganography is a way of securing data inside another form of data. Steganography methods can be applied to images, video or audio file.

However, steganography is written in characters together with hash marking, however its usage inside pictures is additionally common. Moreover, Networks need to be protect using cryptography and steganography.

## II. RELATED SURVEY

Recent cryptography doing a powerful approach and plans new cryptographic algorithms about computational hardness expectations. It is hypothetically possible to breakdown, but it is difficult to do any practical means [2]. Cryptography is applied to secure army related

information to secure the national security. Steganography system can be applied using two techniques. Initially, the longitudinal domain based steganography, the secret message bits replace where the least significant bits (LSB) of the cover object. Furthermore, the transform domain based steganography [4]. Network investigation and observing systems will not flag messages or files that contain steganographic data. Therefore, if anyone tried to take important personal data, they could hide it within another file and send it [6].

Cloud Computing

### III. CRYPTOGRAPHY

Cryptography is a way of transferring the data over the Internet by the cryptographic algorithms to be difficult to attack the confidential or private data. Cryptography done with two terms, encryption and decryption. The process of transferring a message text to cipher text called cryptography. Moreover, decryption is the opposite process of encryption.

### 3.1 CRYPTOGRAPHY ALGORITHM

Its mathematical formula utilized to mix the plaintext characters into cipher text. Encryption means converting plaintext to cipher text using the cryptography algorithms, and decryption is transforming cipher text back to plaintext using the same cryptographic algorithm.

Cryptography algorithms divided to two categories:

• Stream algorithms: Work on plaintext one byte at a time, where a byte is a number, character or special character.

• Block algorithms: Work on plaintext in groups of bytes, called blocks. Typical block sizes for new algorithms are the 64-bytes, little suffice that can be work with, however it big enough so codes cannot be break. Regrettably, with the present microprocessors speed, it shows to be relatively easy task breaking the 64-byte algorithm that used brute force

### 3.1.1 Types of Cryptography:

- Secret Key Cryptography
- Public-Key Cryptography
- Hash Functions

### 3.1.2 Advantages and Disadvantages:

- **Advantages**
  - message hiding and safe privacy.
  - You can write whatever you want and however you want to keep your code a secret.

- **Disadvantages**
  - Taking too much of time.
  - If you were to send a code to another person in the past, it will take long to get to that person.
  - It's a long process.

### IV. STEGANOGRAPHY

Steganography a method of embedding secreted message/data in a way to be no one enabled to identify the result of the messages, except the sender and receiver. It's important to disguise the sensitive data or information so nobody can detect.

### 4.1.1. Types of Steganography:

- *Text Techniques:* this technique hides a data which known as text steganography using text media. It hides the text behind the other text file.
- *Image Techniques: t*his technique uses images as cover object. Steganography has two steps process:
  1) Creating a steganography image, which is the mixture of message and carrier.
  2) Extracting the message image from the steganography image.
- *Audio Steganography*: this method embeds the secret data sound to be act as cover media. Such as, MP3, WAV and AU sound files.
- *Video steganography:* This technique is mixing sound and image and sending it together in combine form over the transmission medium.

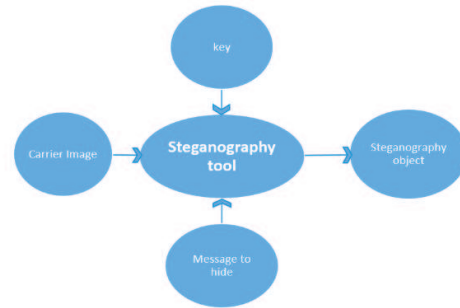### 4.1.2 The Steganography model consists of three components



**Figure -1 – Steganography Models**

### 4.1.3 Steganography Techniques:

- *Spatial Domain methods*: These methods hide data by changing some bits in the image pixel value. There are many spatial domain methods such as, least significant bits (LSB), Pixel values differencing (PVD), Edges based data embedding method (EBE) and Pixel intensity based LSB.

- *Transform Domain techniques:* this technique is embedding the secret data in the transform or frequency domains of the cover object. There are many different algorithms and transformations used for hiding information in an image. This technique is more strong and complex. There are some transform domain techniques such as, DFT (discrete Fourier transformation technique), DCT (discrete cosine transformation technique) and DWT (discrete wavelet transformation technique).

- *Masking and Filtering:* This method hides the secret data or message in the more important parts by marking an image. This technique is stronger than LSB technique. This technique has limitation which is this method can be useful only for the gray scale images and 24 bits images.

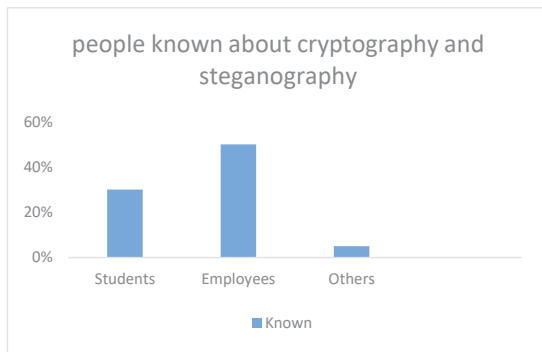## V. APPLYING NETWORK PROTECTION USING CRYPTOGRAPHY AND STEGANOGRAPHY IN OMAN



people known about cryptography and steganography

**Figure – 2 – Analysis Graph**

### 5.1.1. How people in Oman know about cryptography and steganography

- Because of modern technologies and networking services, people not have enough background about how they protect their networks. We have asked different kinds of people like, students, employees and others. As shown in this Chart.

- This chart show people whom known about cryptography and steganography. We found

that students of schools and colleges only about 30% who know about cryptography and steganography. Most students of the 30% are whom specialists in information security and networks or taking self-learning courses about cryptography and steganography. However, only half of the employees that we have met known about cryptography and steganography.

### 5.1.2 Applying cryptography and steganography courses in schools and colleges:

We are thinking to add these courses because nowadays many people are facing network problems like, hacking, account stooling and others. In addition, people should protect their data or information using cryptography and steganography by joining to these courses. Moreover, we want stakeholders (Ministry of Education and Ministry of Manpower) to employ the specialist's staff and teachers that will help people to improve.

### 5.1.3 Benefits of Applying cryptography and steganography in Oman:

- Protecting organizations and intuitions information or data in Oman.
- Protection of knowledge that has shared between computers on the Oman networks.
- People in Oman can avoid network problems.

## VI. CONCLUSION

In conclusion, as we mention many people are need to protect their sensitive data to avoid the detection from third party. People have to secure their sensitive data before transporting or storing it. Cryptography and steganography techniques act as solution to solve these security problems.

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