Overview of Digital Stenography

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Introduction

- Definition : The art and science of writing hidden messages in such a way that no one, apart from the sender and intended recipient, suspects the existence of the message

http://en.wikipedia.org/wiki/Steganography

- A form of security through obscurity

History

Early Steganography

- Early Greeks used Steganography :
  - Shaved head of slave and tattooed a message. When hair grew back, slave sent to deliver the message.

  - Inscribed message on wooden tablet and covered it with wax

Stenography Techniques

- Physical steganography
  - Using a physical medium to hide messages with
- Network steganography
  - Involves taking advantage of communication protocols
- Printed steganography
  - Example : picture you stare at for a long time trying to see the image and your eyes finally adjust to it and you see a different shape appear out of the image

Stenography Techniques contd..

- Digital Steganography : hiding data within data(i.e document file, image file, program or protocol)

- Replacing bits/bytes that are not hidden with secret information

Digital Steganography Methods

Steganography in Images

- Hiding information in pictures
- Uses LSB (Least Significant Byte) method
- Red, Green, and Blue (8 bits each) for every pixel in Bitmap image
  - replace last bit(s) of each RGB value with bit(s) from the secret message
  - or replace every nth pixel with value of message

Digital Steganography Methods

Steganography in Images contd…

- Example: this map of an airport……….

Digital Steganography Methods

Steganography in Images contd...

- is embedded in this image

Digital Steganography Methods

Steganography in Audio

- Depending on type of file
  - Replace last bit(s) with bit(s) from the secret message
  - Encode during compression

Digital Steganography Methods

Steganography in Other ways

- Text (Null Ciphers)
    - Use normal text to but change every n^{th} letter of every m^{th} work

- Example : "To human eyes, data usually contains known forms, like images, e-mail, sounds, and text. Most Internet data naturally includes gratuitous headers, too. These are media exploited using new controversial logical encodings: steganography and marking"

Take first letter of every word. Reads "The duck flies at midnight. Tame uncle sam"

- Combining Cryptography with Steganography

Practical Uses

- Watermarking
  - Identifier hidden in an image to track source
- Branding/Copyright
  - Example: HP and Xerox printers. Tiny dots containing printer serial numbers on pages
- Alleged use by terrorist
  - Alleged use in planning of 9/11 attacks
- Alleged use by intelligence services
  - Alleged used by Russian foreign intelligence service to communicate with spies

Comparison with Cryptography

- Unlike cryptography, steganography conceals the fact that hidden information exists

- Different goals:
  - Cryptography: prevent unintended recipient from knowing intended meaning of the message
  - Steganography: prevent unintended recipient from suspecting that the hidden message even exists

Detection and Countermeasures

- Very difficult to do.

- Steganalysis : detection of steganographically encoded packages in computing

- Some tools available
  - Stegdetect : compares images sets
  - Gargoyle : determine probability of a medium being encoded

Conclusion

- Steganography ancient but still very much in use

- Digital advancement brings new methods of digital steganography

- Not to be confused with cryptography

- Cryptography : security through encryption

- Steganography : security through obscurity