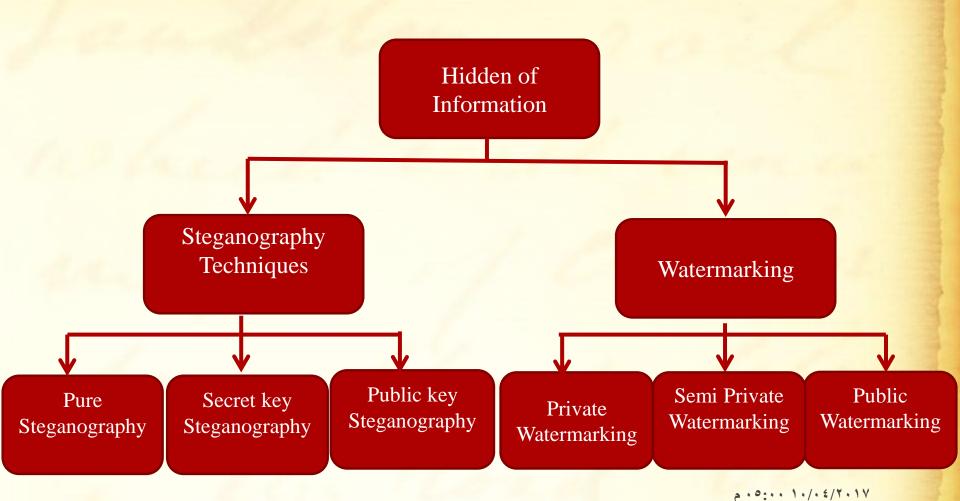


Steganography Techniques An Overview



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Computer

*Classification of Information Hiding



*Steganography

It is the art and science of writing hidden messages in a way so that no one except the sender and the intended recipient doubt the existence of the letter. **Stegano** means protected or covered and **graphy** means the

Writing.



*Steganography Techniques

1. Physical Techniques

> Hidden messages within wax tablet



➤ Hidden messages on messenger's body



> Hidden messages on paper written in secret ink



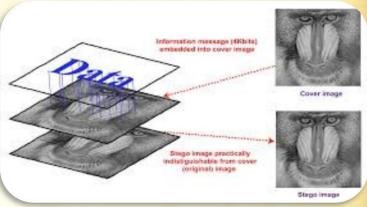
➤ Messages written in Morse code

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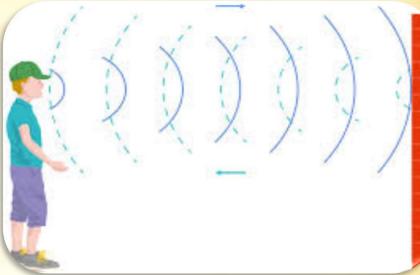
2. Digital technique

> Concealing messages within the lowest bits of images or sound files.

➤ Concealing data within encrypted data or within random data.



Concealed messages by modifying echo in the audio file



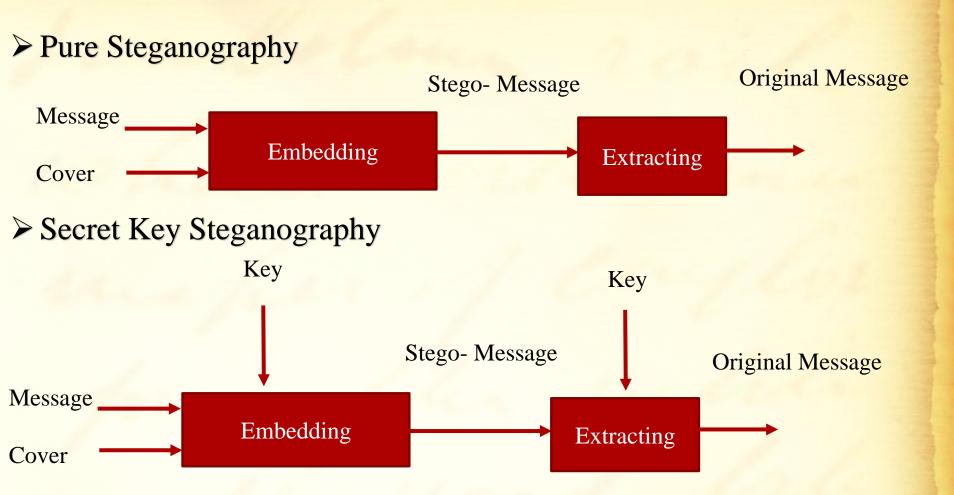
> Data included in the neglected sections of the file

3. Network technique

➤ Steganography — the concealment of messages in Voice-over-IP conversations

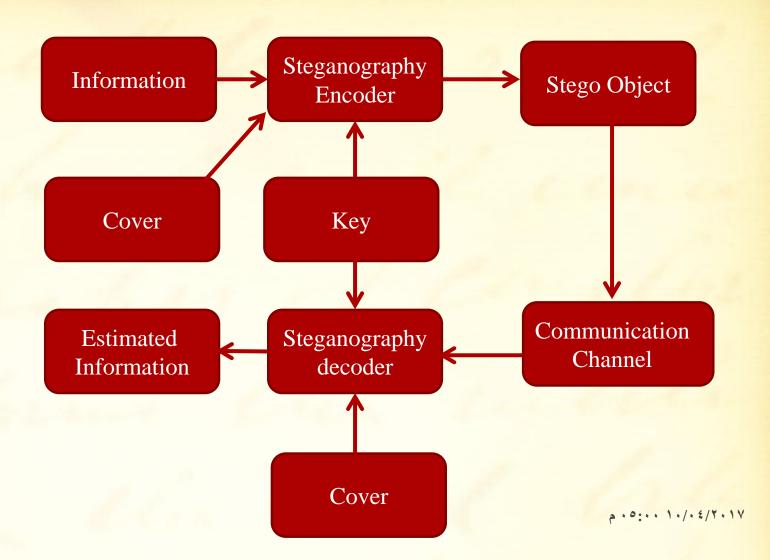
➤ WLAN Steganography — transmission of steganograms in Wireless Local Area Networks

*Steganography Types



. 0 . . . 1 . / . ٤/٢ . 1٧

*General Steganography Model



*Measurement Parameters of Steganography

- > High Capacity:
- **Robustness:**
- **Resistance:**
- > Computation Complexity:

*Implementation Of Steganography

1. Using text

Text steganography can be classified in three basic categories :-

- > Format based methods
- > Random and Statistical Generation
- ➤ Linguistic Methods

*Examples of Text Steganography

- > The first letter of each word
- For example
- Bring Us Your Invoice By Monday which gives BUY IBM
- ➤ Use Template model
- THE MOST COMMON WORK ANIMAL IS THE HORSE. THEY CAN BE USED TO FERRY EQUIPMENT TO AND FROM WORKERS OR TO PULL A PLOW. BE CAREFUL, THOUGH, BECAUSE SOME HAVE SANK UP TO THEIR KNEES IN MUD OR SAND, SUCH AS AN INCIDENT AT THE BURLINGTON FACTORY LAST YEAR. BUT HORSES REMAIN A SIGNIFICANT FIND. ON A FARM, AN ALTERNATE WORK ANIMAL MIGHT BE A BURRO BUT THEY ARE NOT AS COMFORTABLE AS A TRANSPORT ANIMAL. Which gives Horse Ferry sank in Burlington. Find **Alternate Transport**

- > Change Points place
- ➤ Line Shift Coding
- ➤ Word Shift Coding

Now is the time for all men/women

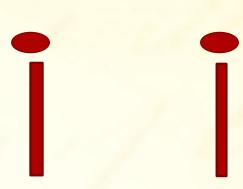
Now is the time for all men/women

> Feature Coding



➤ Feature Coding

➤ Open method



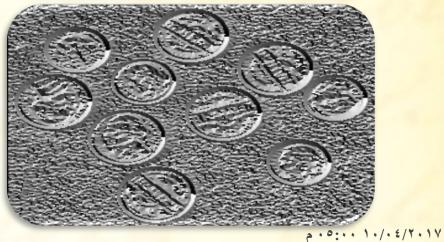
2. Using images

Digital images are divided into the following types:

➤ Binary images

> Images gray gradient





➤ Color images





*Image Steganography Parameters

- **Cover-Image:**
- > Message:
- > Stego-Image:
- > Stego-Key:

*Image Steganography Techniques

1. Spatial Domain Methods:

Spatial domain techniques are broadly classified into:

- Least significant bit (LSB)
- ➤ Pixel value differencing (PVD)
- Edges based data embedding method (EBE)
- Random pixel embedding method (RPE)
- Mapping pixel to hidden data method
- Labeling or connectivity method
- > Pixel intensity based method
- > Texture based method
- > Histogram shifting methods

2. Transform Domain Technique:

- Discrète Fourier transformation technique (DFT).
- Discrète cosine transformation technique (DCT).
- Discrète Wavelet transformation technique (DWT).

3. Distortion Techniques

4. Masking and Filtering

*Examples about image steganography

LSB method

For example taking gray scale image or an color image

 $183 \rightarrow 10110111$

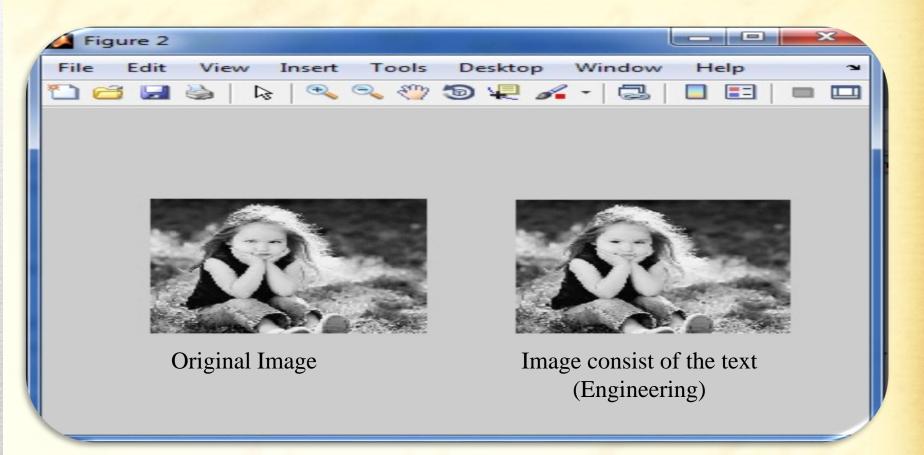
Store logic (1) in LSB \rightarrow (183) 10110111

Store logic (0) in LSB \to (182)10110110

For Example the text ((Engineering)) is converted to ascm = 101 110 103 105 110 101 101 114 105 110 103 Then converted to binary Then each bit from these binary is putting instead of the LSB of

the image pixels codes

*Gray scale image



*Hiding Information in RGB Components

For example word "ABC" ASCII code of A=65 and corresponding binary is 01000001. ASCII code of B=66 and corresponding binary is 01000010. ASCII code of C=67 and corresponding binary is 01000011.



Original green component



		R	ed						Green								Blue							
1	0	1	1	0	0	0	. 1	1	1	0	0	1	1	0	0	1	0	1	0	1	0	1	0	

Green component of second pixel is replaced with binary of 66 i.e. B.

Replaced green component

$$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$$

		R	ed						Green									Blue							
1	0	1	1	0	0	0	. 1	0	1	0	0	0	0	1	0	1	0	1	0	1	0	1	0		

Original blue component



	Red								Green								Blue							
1	1	0	1	0	0	1	.1	1	0	1	1	1	0	0	1	1	1	0	1	0	0	1	0	

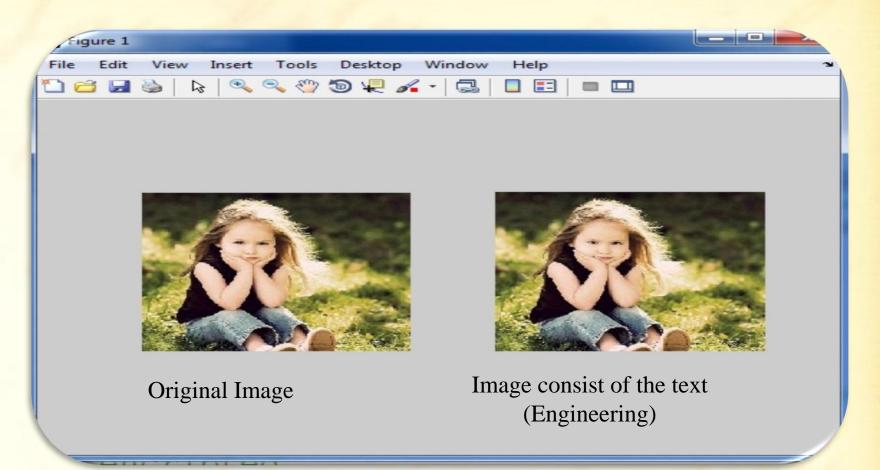
Blue component of third pixel is replaced with binary of 67 i.e. C.

Replaced blue component



	Red							Green								Blue							
1	1	0	1	0	0	1	1	1	0	1	1	1	0	0	1	.0	1	0	0	0	0	1	1

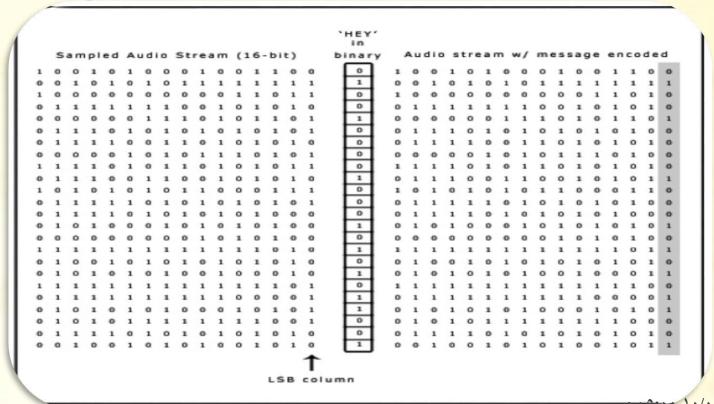
*RGB image



3. Using audio files.

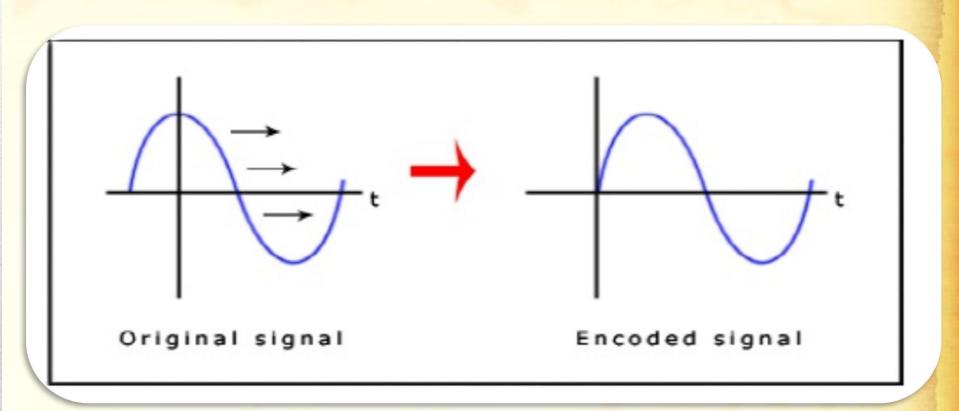
There are three techniques that are used in audio steganography are:

► LSB Coding



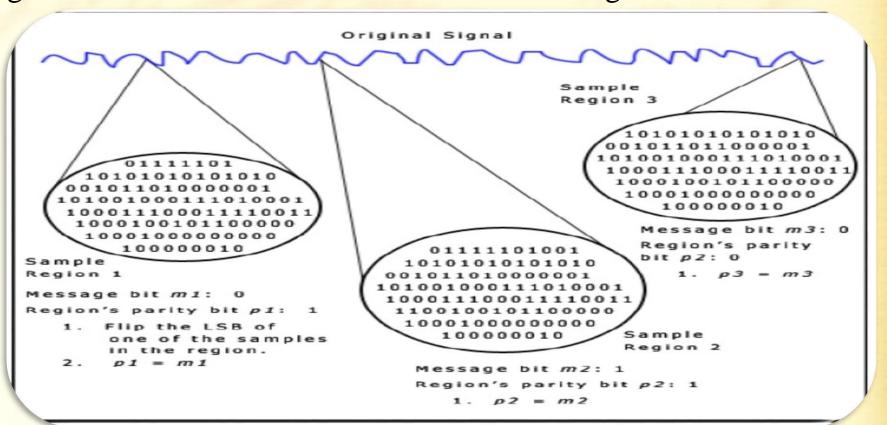
> Phase Coding

In phase encoding scheme the phase of carrier file is replaced with reference phase which represents hidden data.



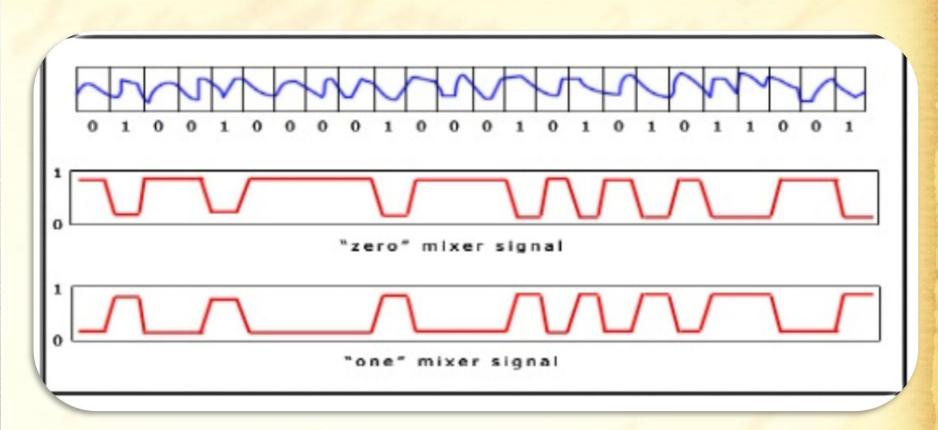
> Parity Coding

In parity coding signals are divided into regions, then parity bit of each region calculated and matched with secret message bit.

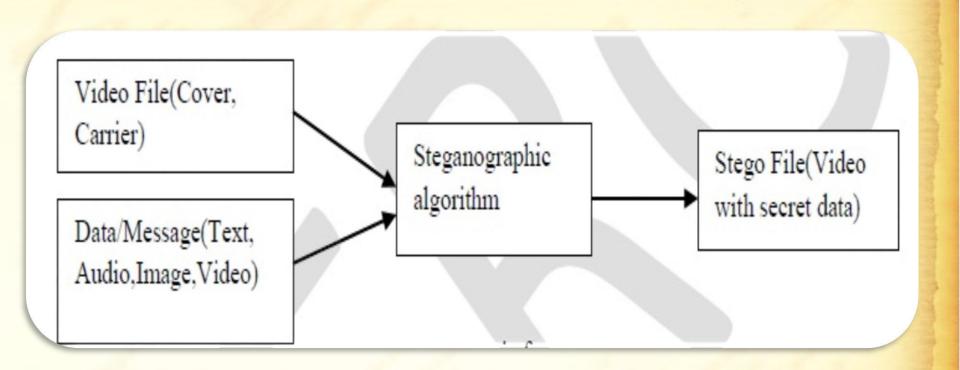


> Echo hiding

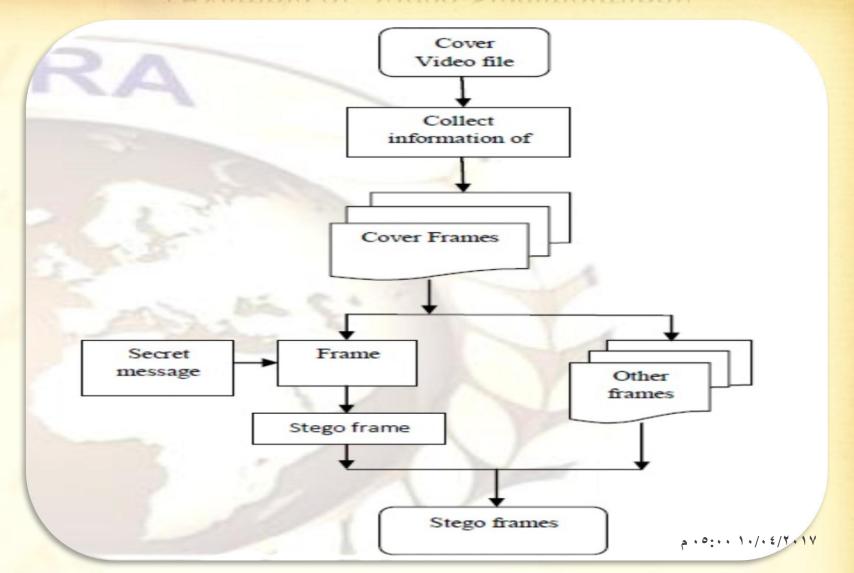
Echo hiding embeds its data by creating an echo to the source audio.



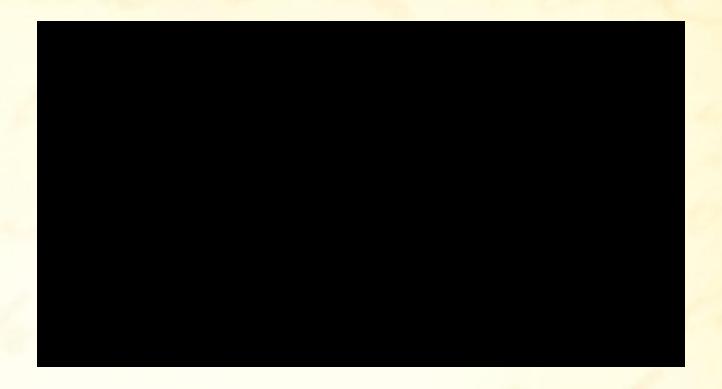
4. Using video files



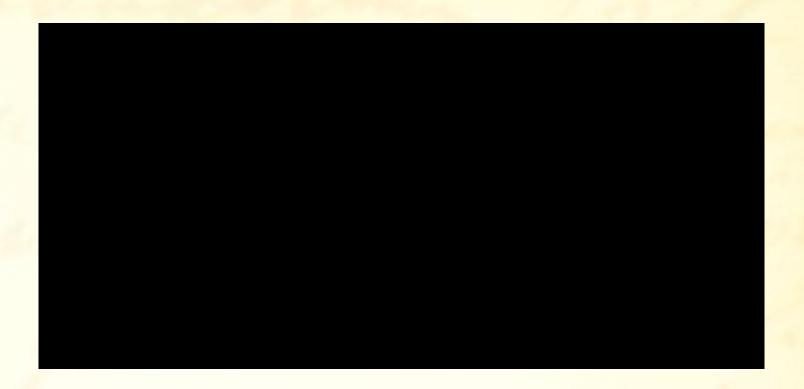
*Example of Video Steganography



*Video Payer



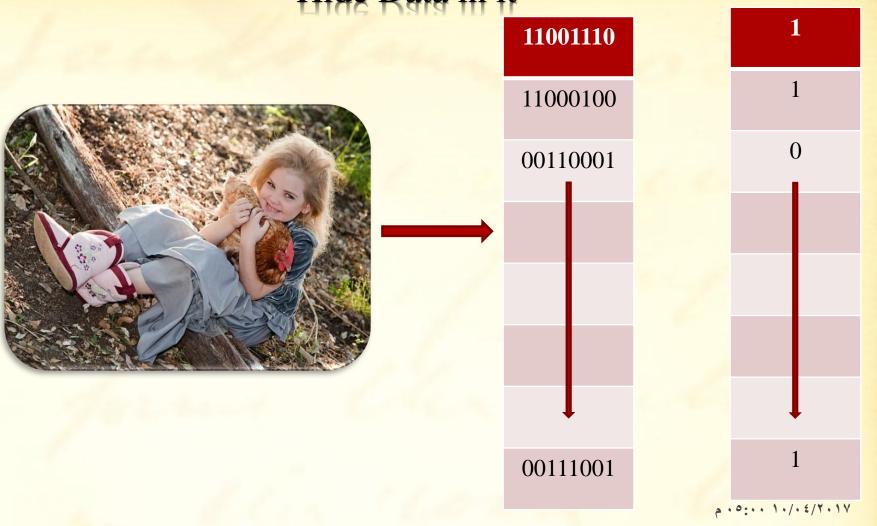
*Split Audio from Video



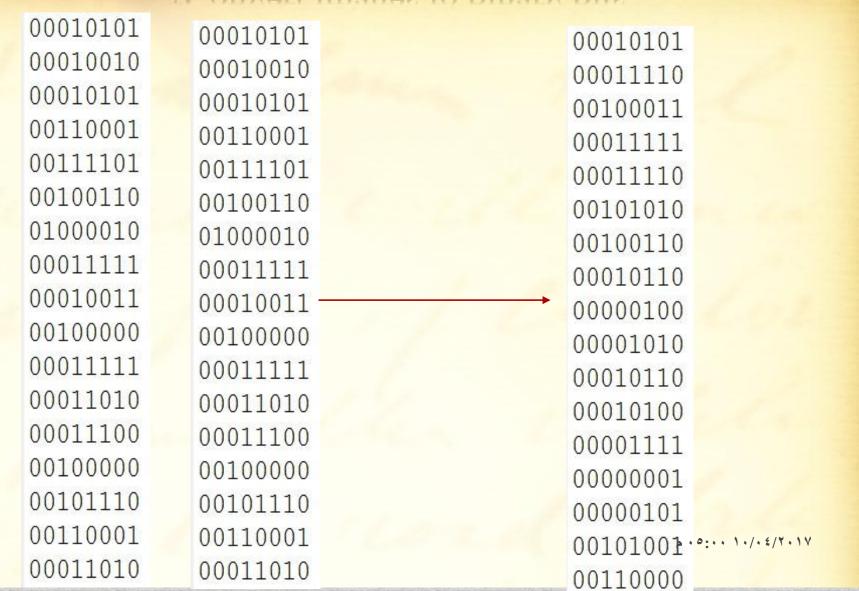
*Convert Video to Frames

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*Select Some Frame to Hide Data in it



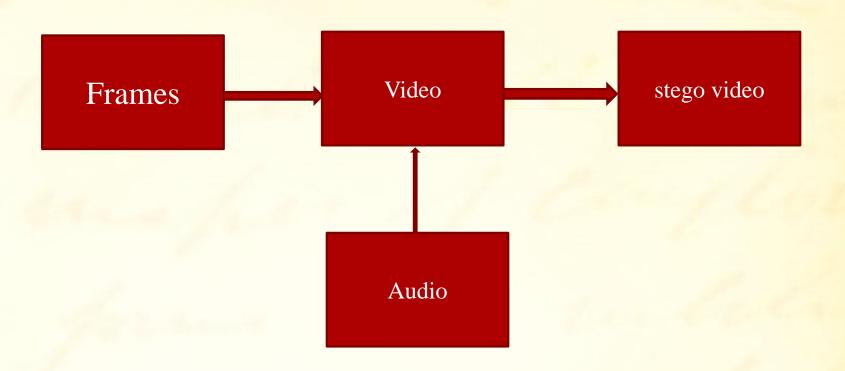
*Convert images to binary bits



*Replace the LSB of Cover Images by the Bits of the send Image

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00010101	←	00010101	00010101	1
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00100110		00100110	00101010	
01000010		01000010	00100110	
00011111		00011111	00010110	
00010011		00010011 -	00000100	
00100000		00100000	00001010	
00011111		00011111	00010110	*
00011010		00011010	00010100	1
00011100		00011100	00001111	1
00100000		00100000	00000001	1
00101110		00101110	00000101	0
00110001		00110001	00101001	1
00011010		00011010	00110000	0

*Final Process at the Transmitter Side



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