



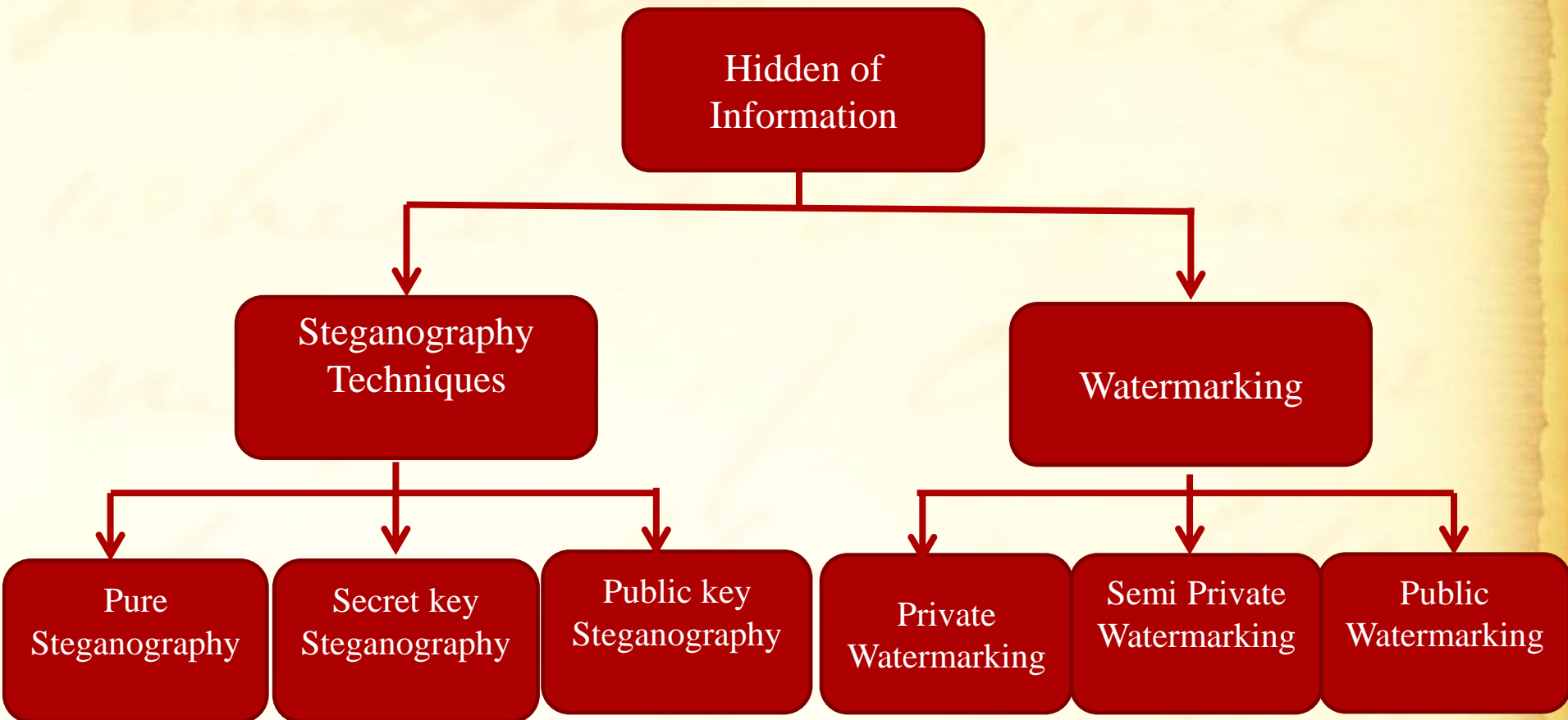
Steganography Techniques An Overview



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*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

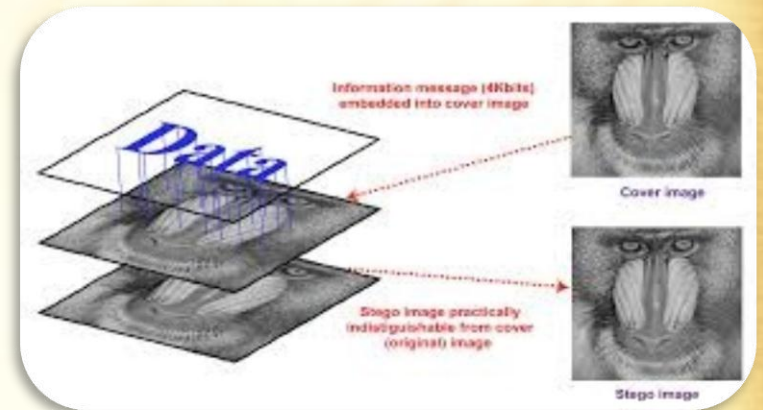
الحرف	لاتيني	الرمز	الحرف	لاتيني	الرمز	الحرف	لاتيني	الرمز	الحرف	لاتيني	الرمز	الحرف	لاتيني
ا	A	--·	د	D	··-	ص	V	····	ك	K	--·	هـ	E
ب	B	····-	ذ	Z	····-	ط	U	···	ل	L	····		
ت	T	-	ر	R	···	ظ	Y	····-	م	M	--		
ث	C	····-	ز	Ö	·---	ع	Ä	·····	ن	N	·-		
ج	J	----·	ص	S	···	غ	G	··--	هـ	É	·····		
ح	H	····	ش	SH	----	ف	F	····	و	W	--·		
ق	O	---	ص	X	····-	ق	Q	····-	ي	I	··		

2. Digital technique

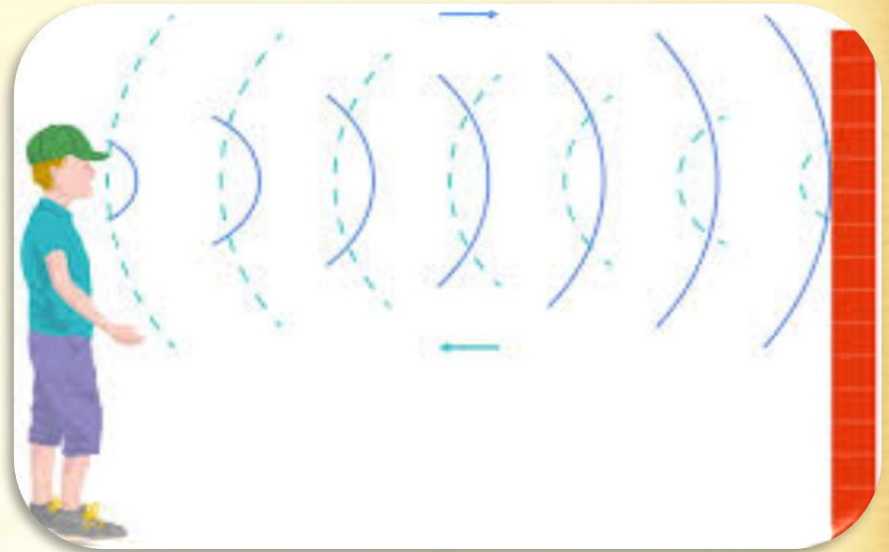
➤ Concealing messages within the lowest bits of images or sound files.



➤ 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

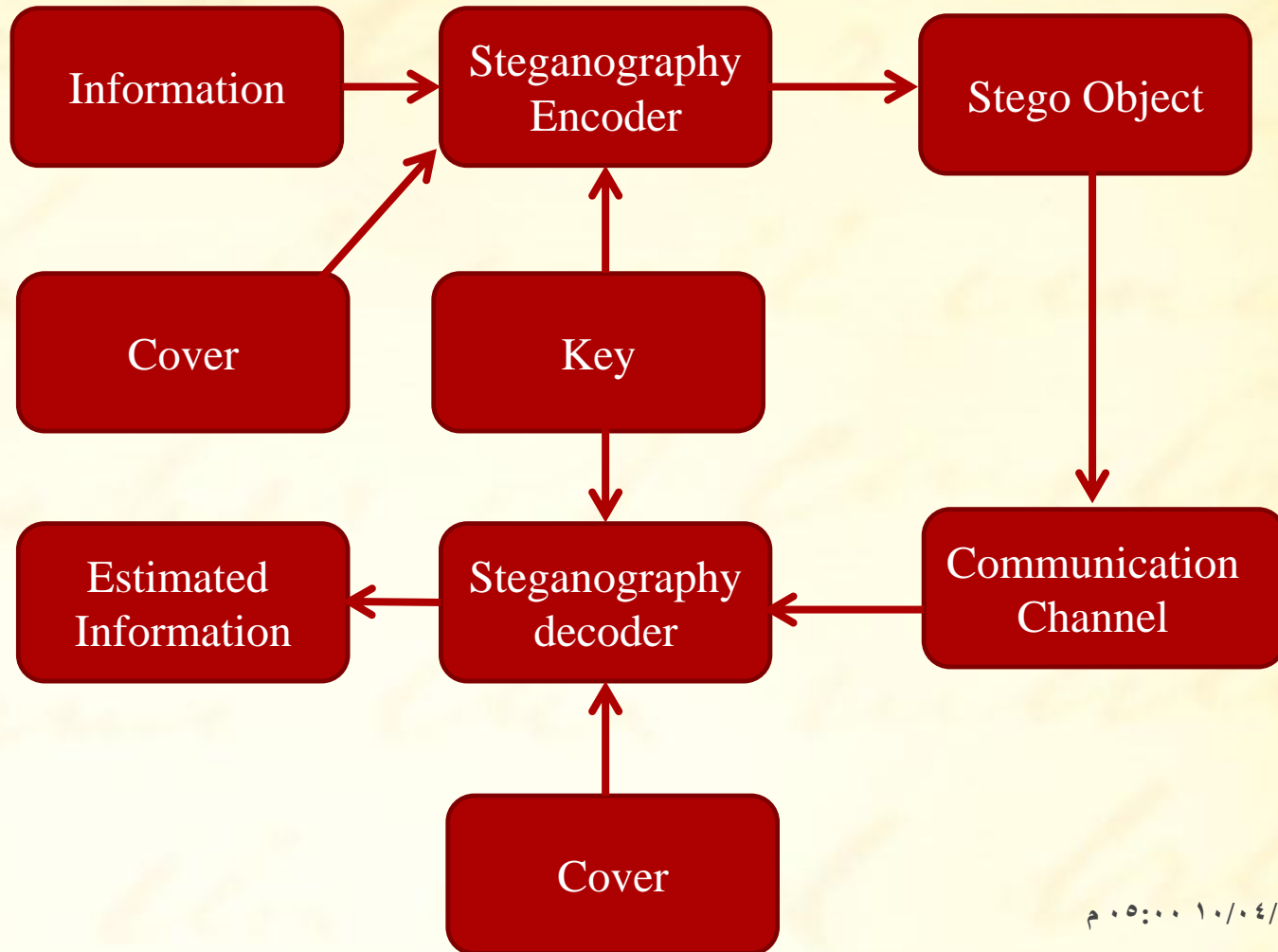
➤ Pure Steganography



➤ Secret Key Steganography



*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

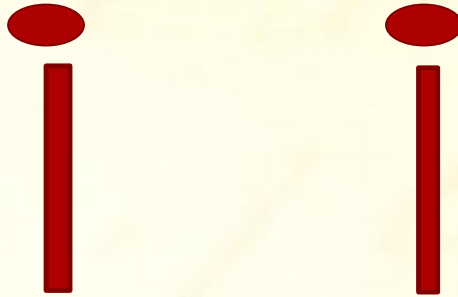
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- Feature Coding



➤ Feature Coding

➤ Open method



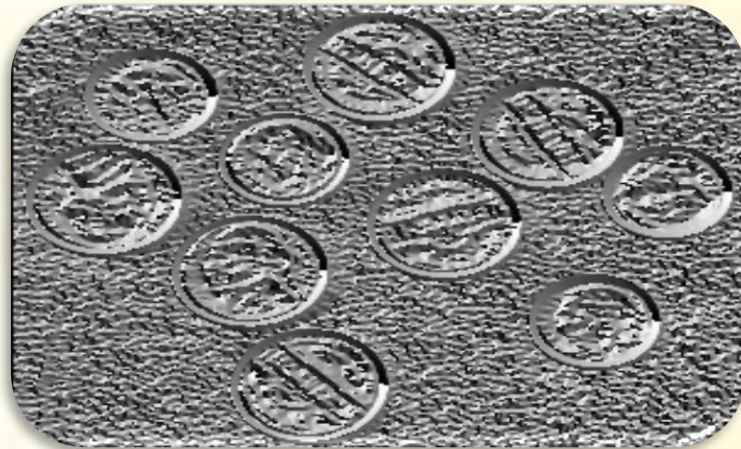
2. Using images

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:

- Discrete Fourier transformation technique (DFT).
- Discrete cosine transformation technique (DCT).
- Discrete 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 → 10110111

Store logic (1) in LSB → (183) 10110111

Store logic (0) in LSB → (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

1100101

1101110

1100111

1101001

1101110

1100101

1100101

1110010

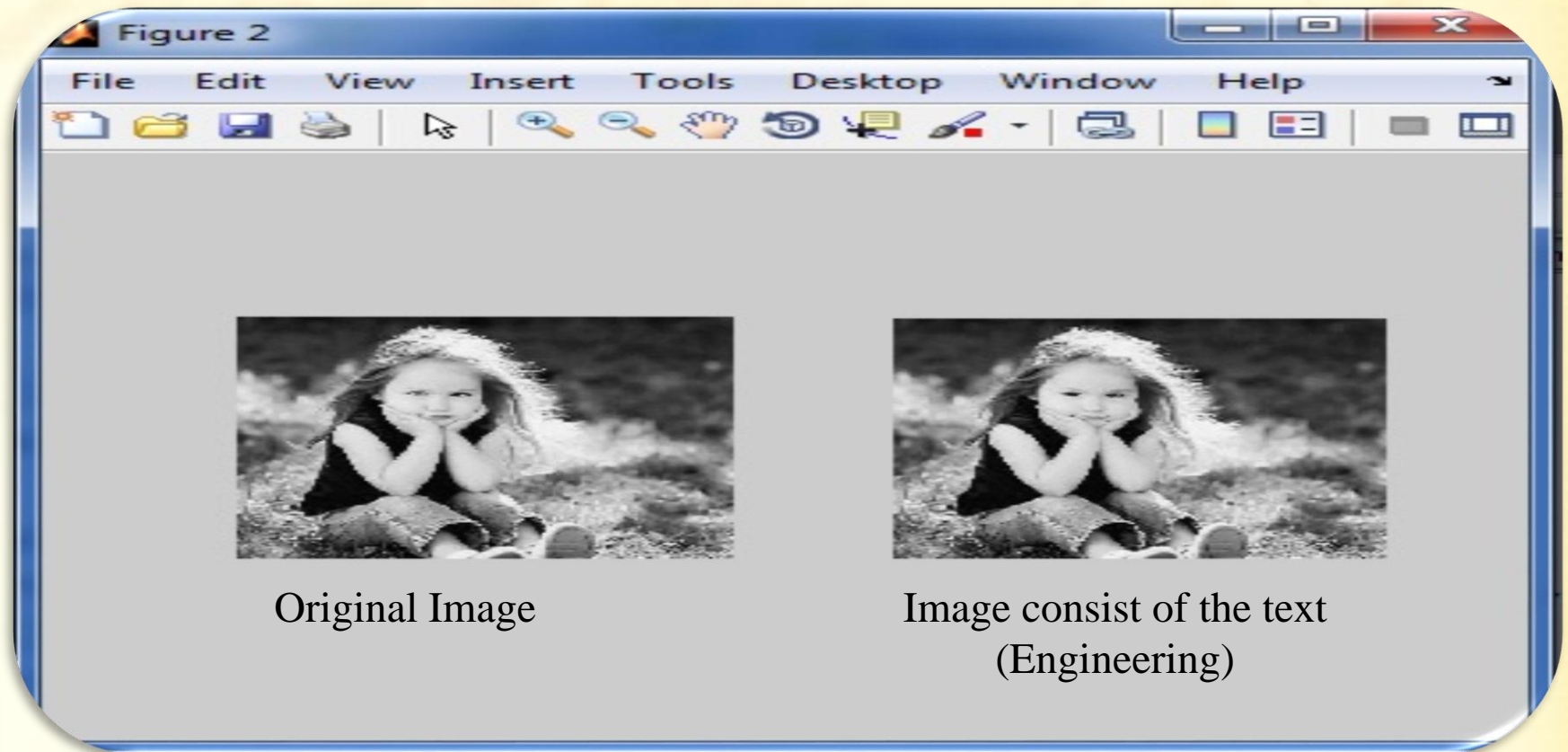
1101001

1101110

1100111

**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 red component



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

Red component is replaced with binary of 65 i.e. A.

Replaced red component



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

Original green component



Red								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



Red								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

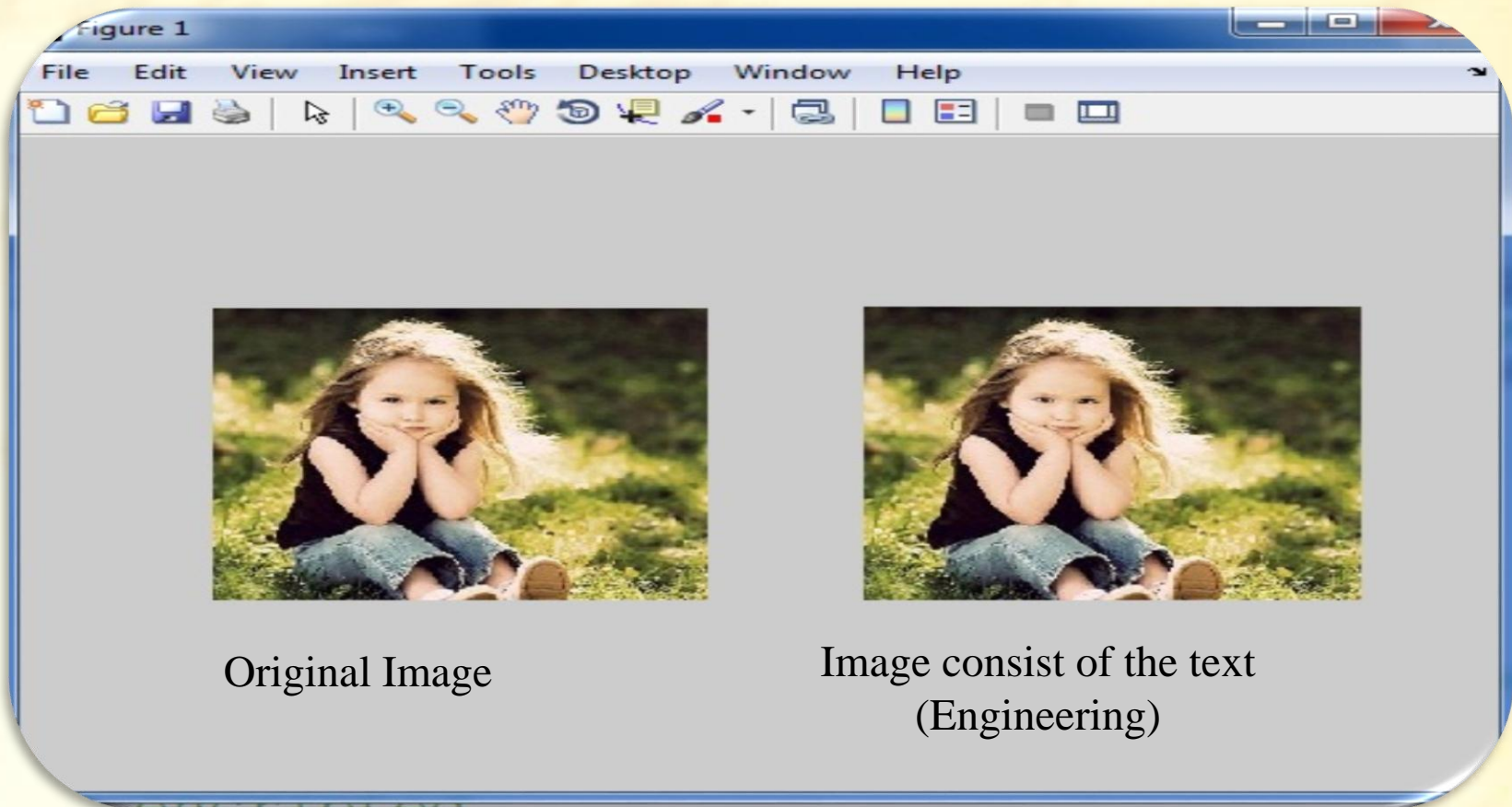
Blue component of third pixel is replaced with binary of 67 i.e. C.

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

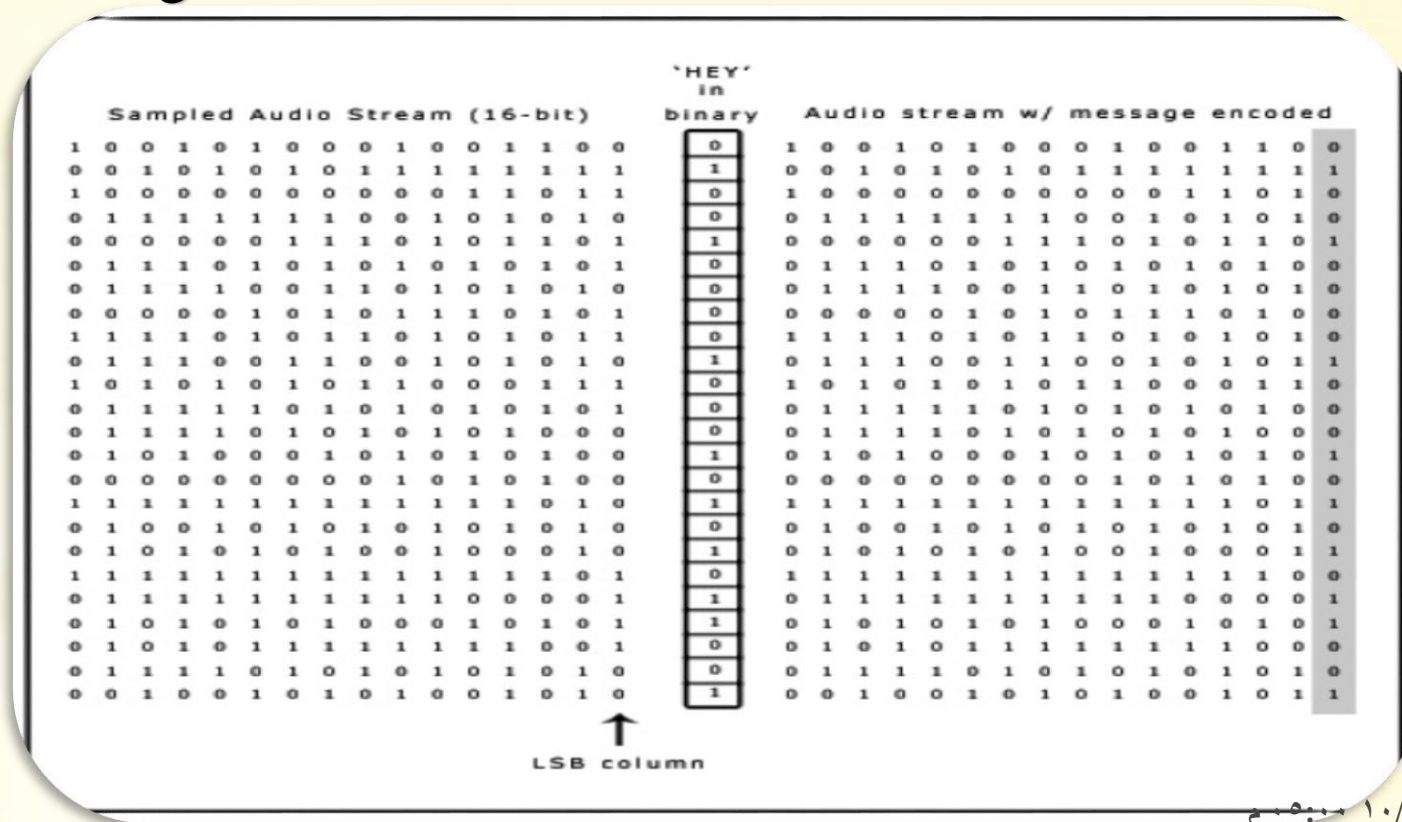
*RGB image



3. Using audio files.

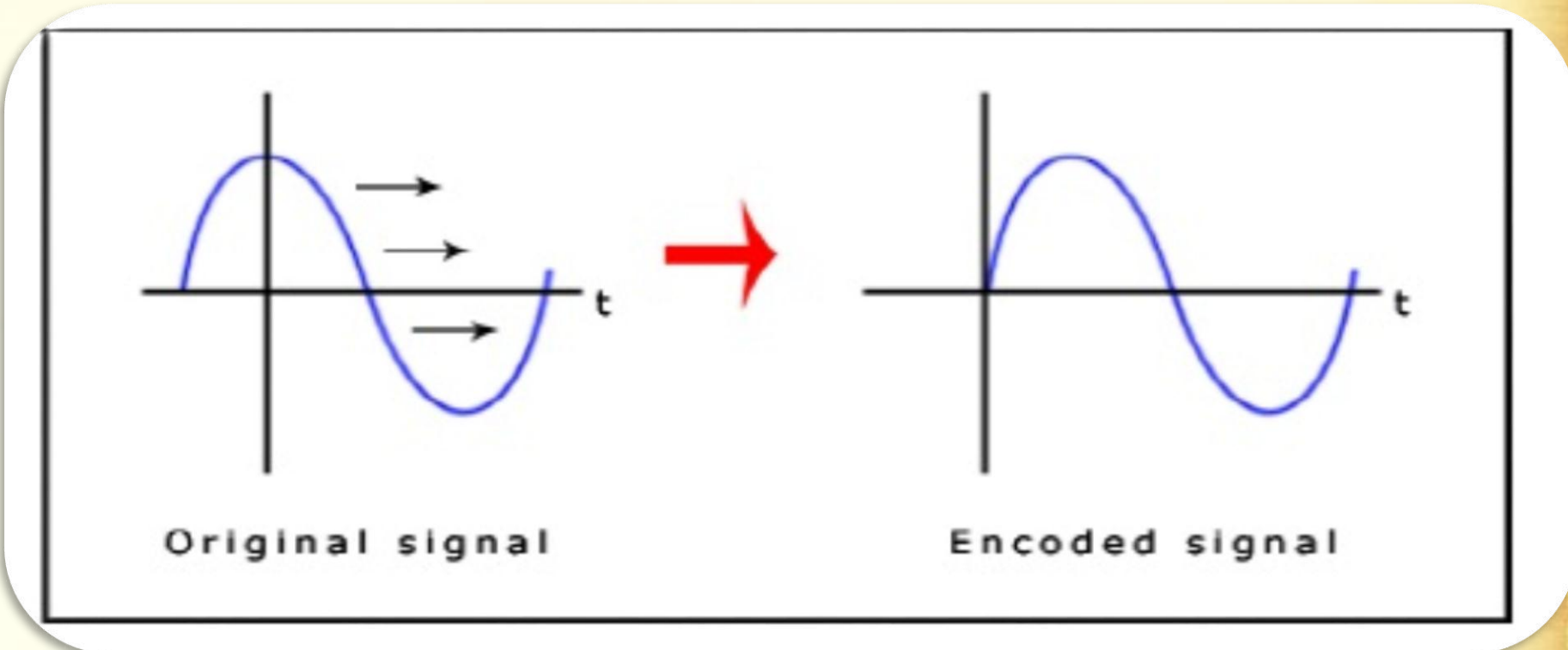
There are three techniques that are used in audio steganography are:

➤ LSB Coding



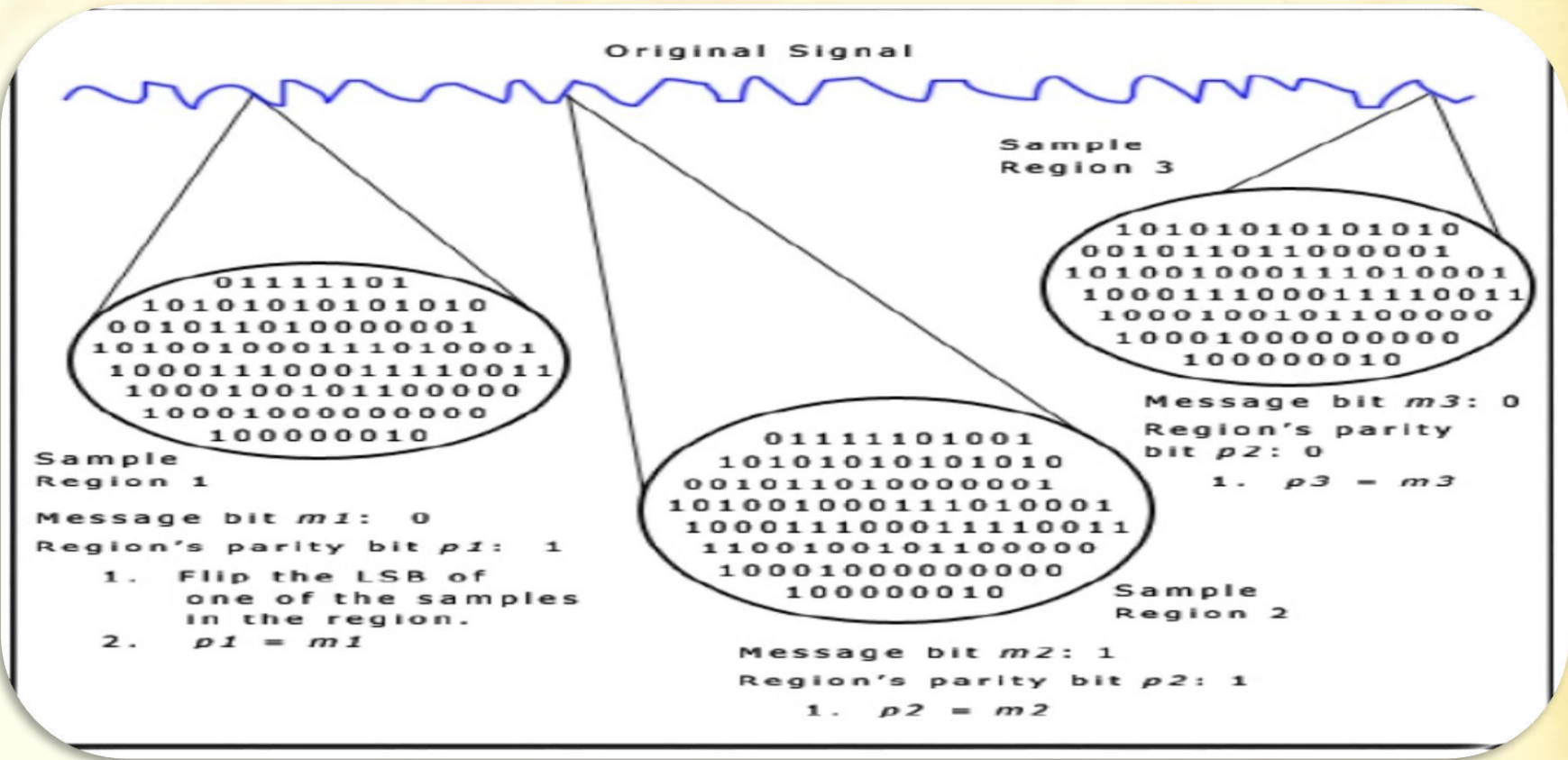
➤ Phase Coding

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



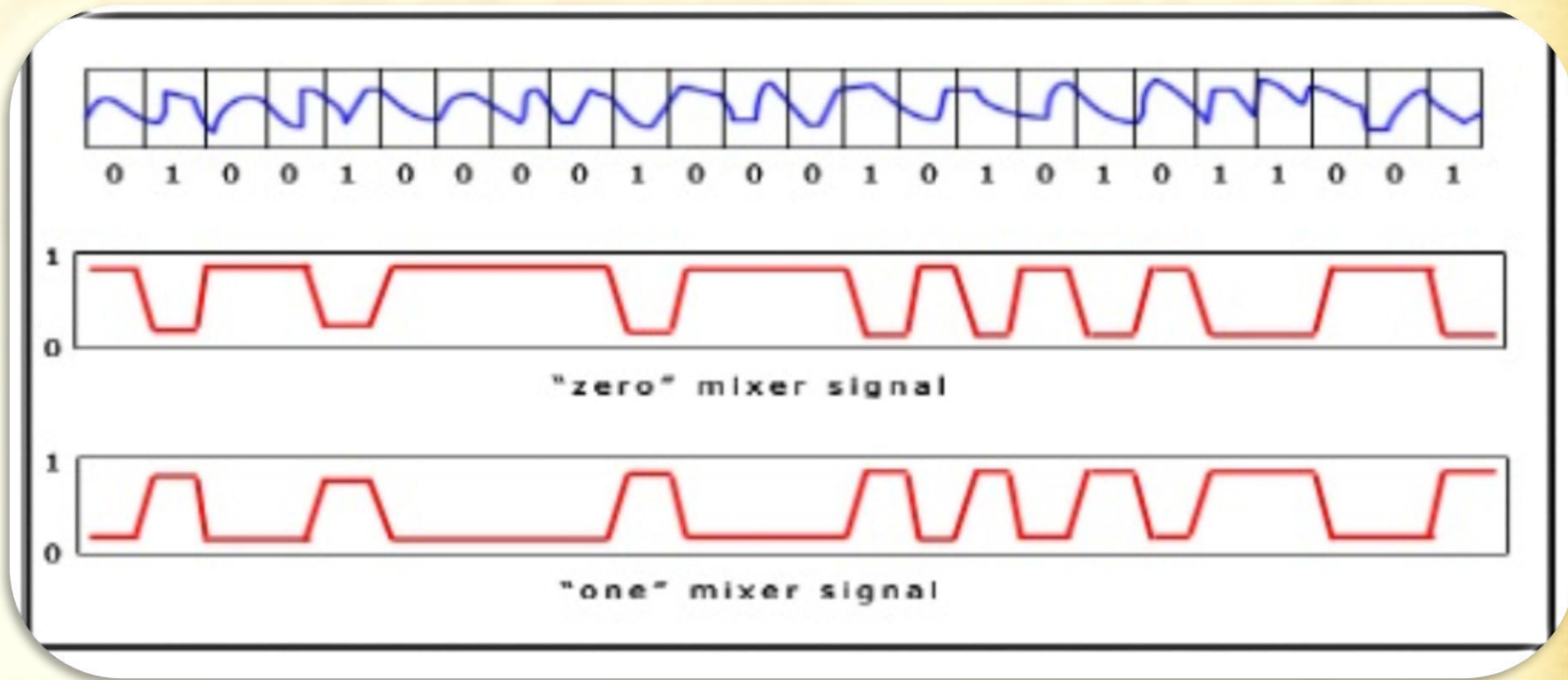
➤ Parity Coding

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

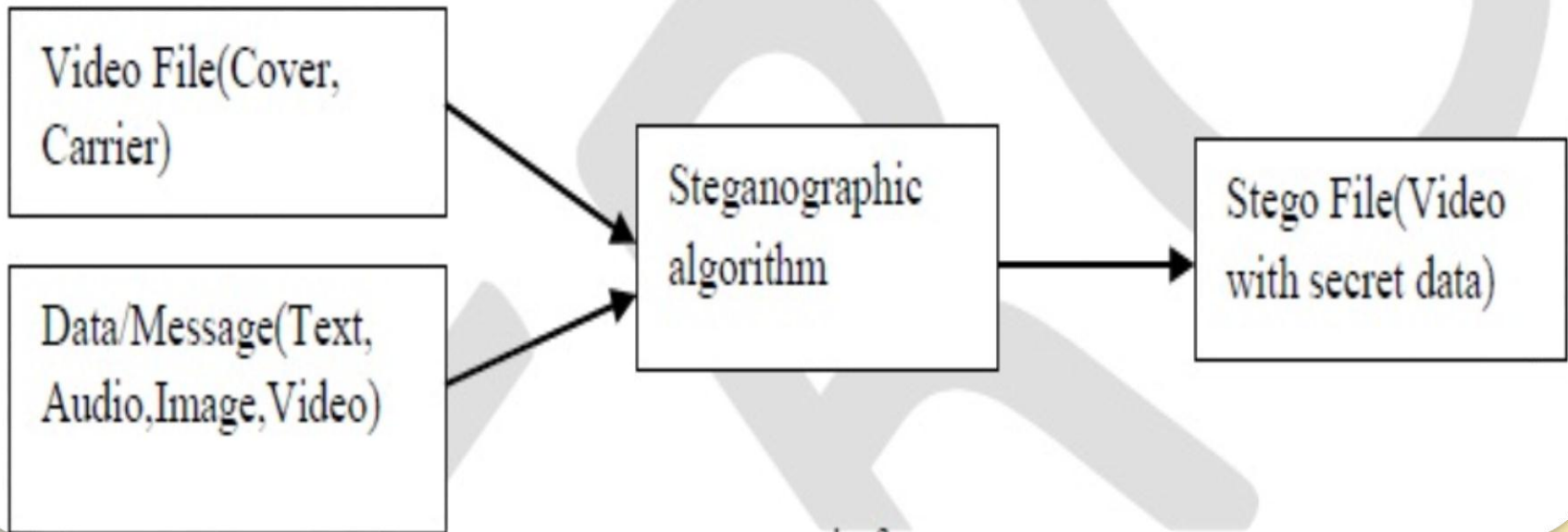


➤ Echo hiding

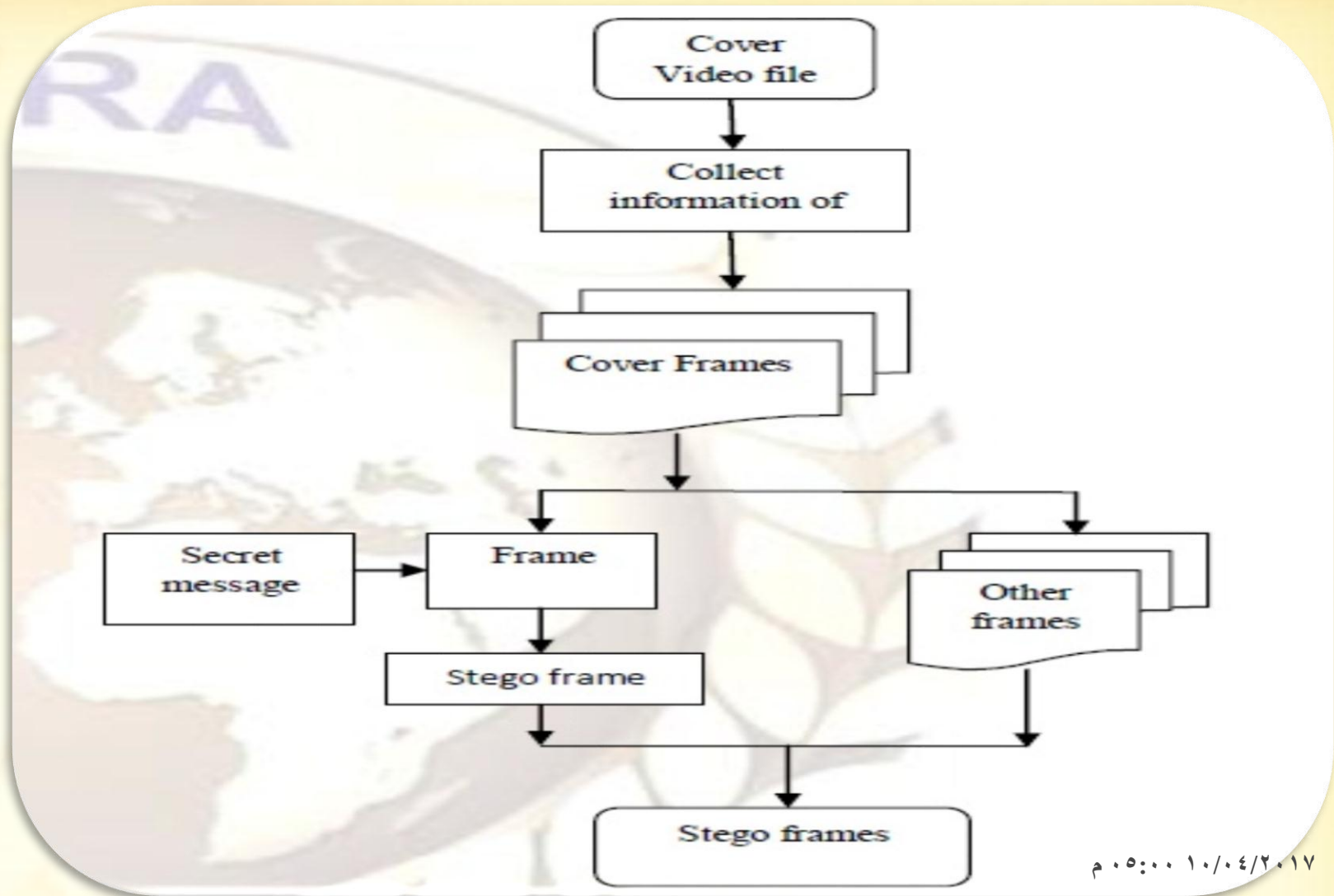
Echo hiding embeds its data by creating an echo to the source audio.



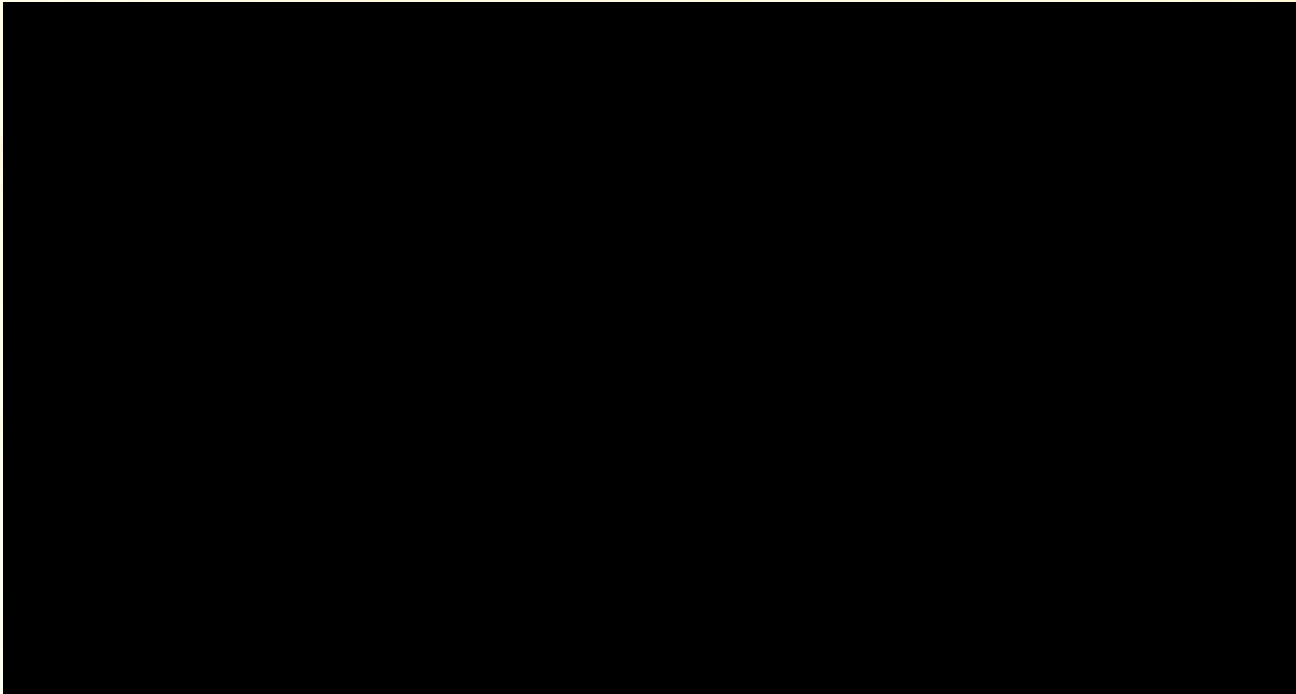
4. Using video files



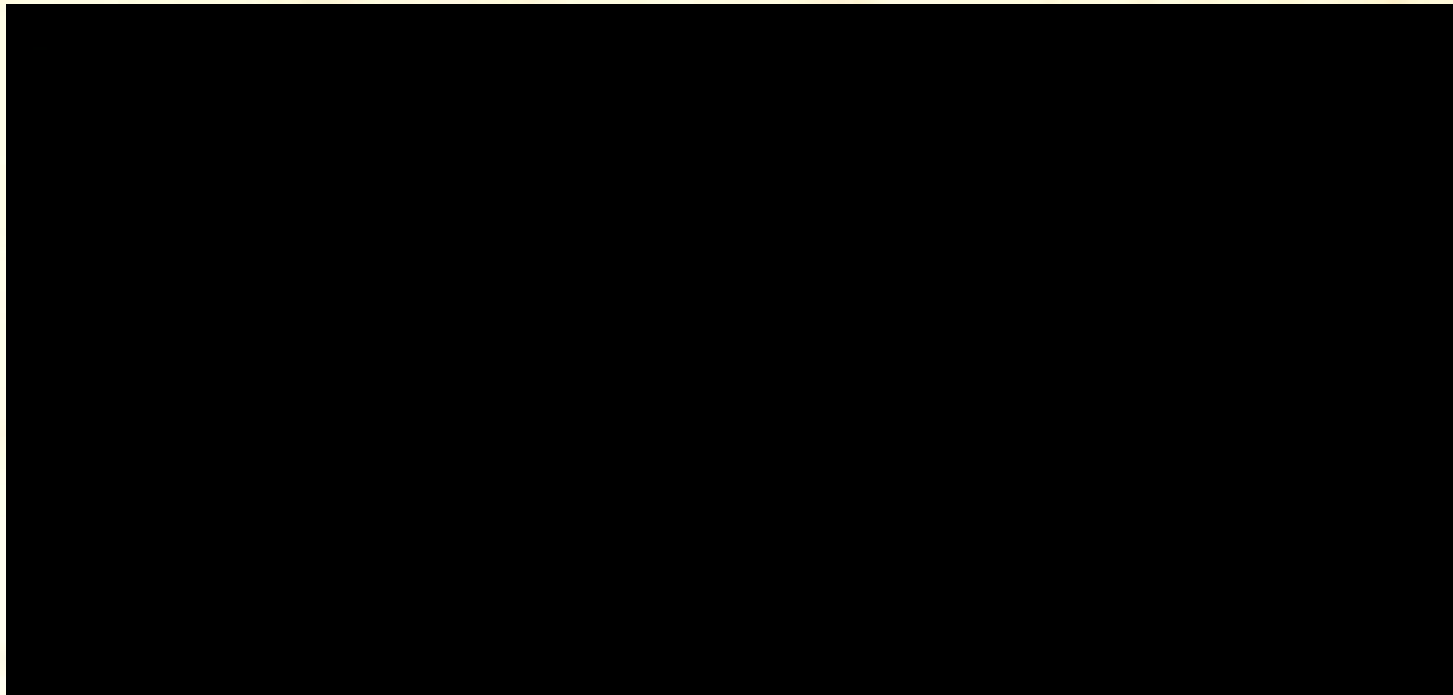
*Example of Video Steganography



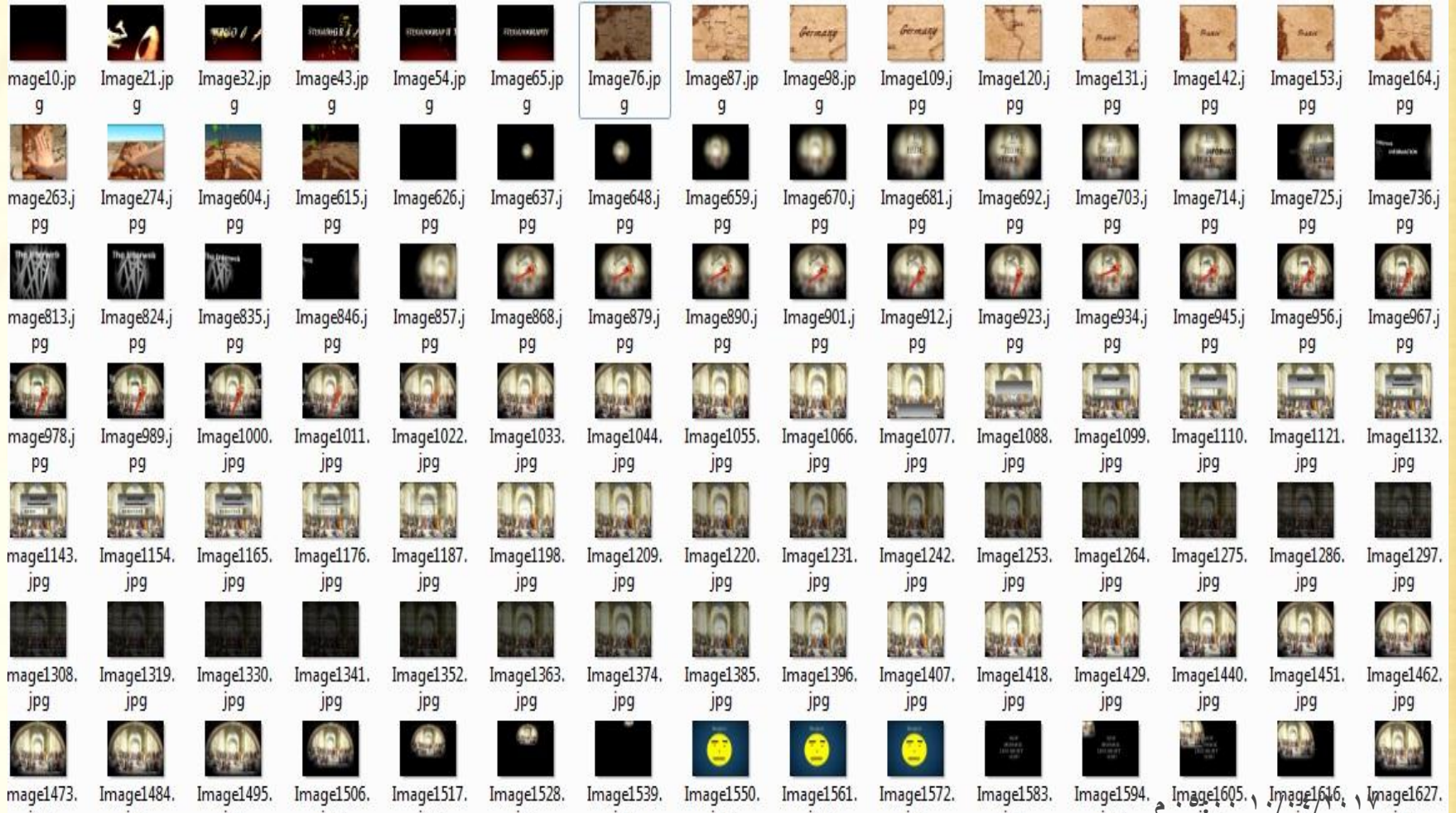
*Video Payer



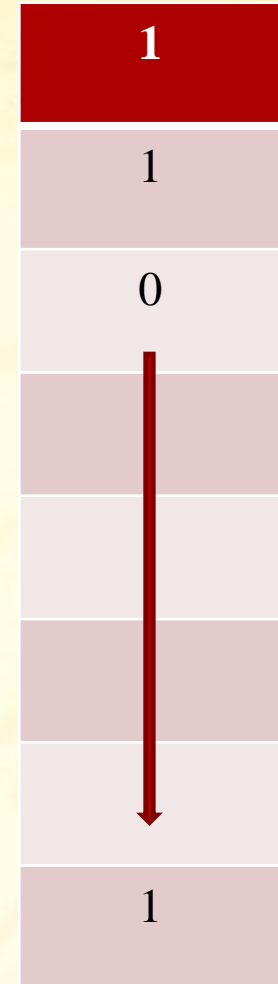
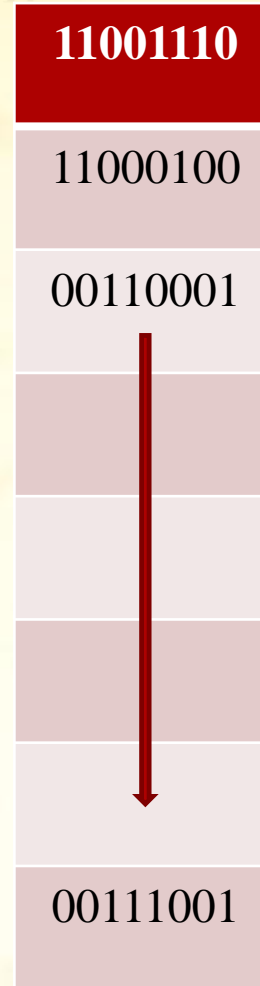
*Split Audio from Video



*Convert Video to Frames



*Select Some Frame to Hide Data in it



*Convert images to binary bits

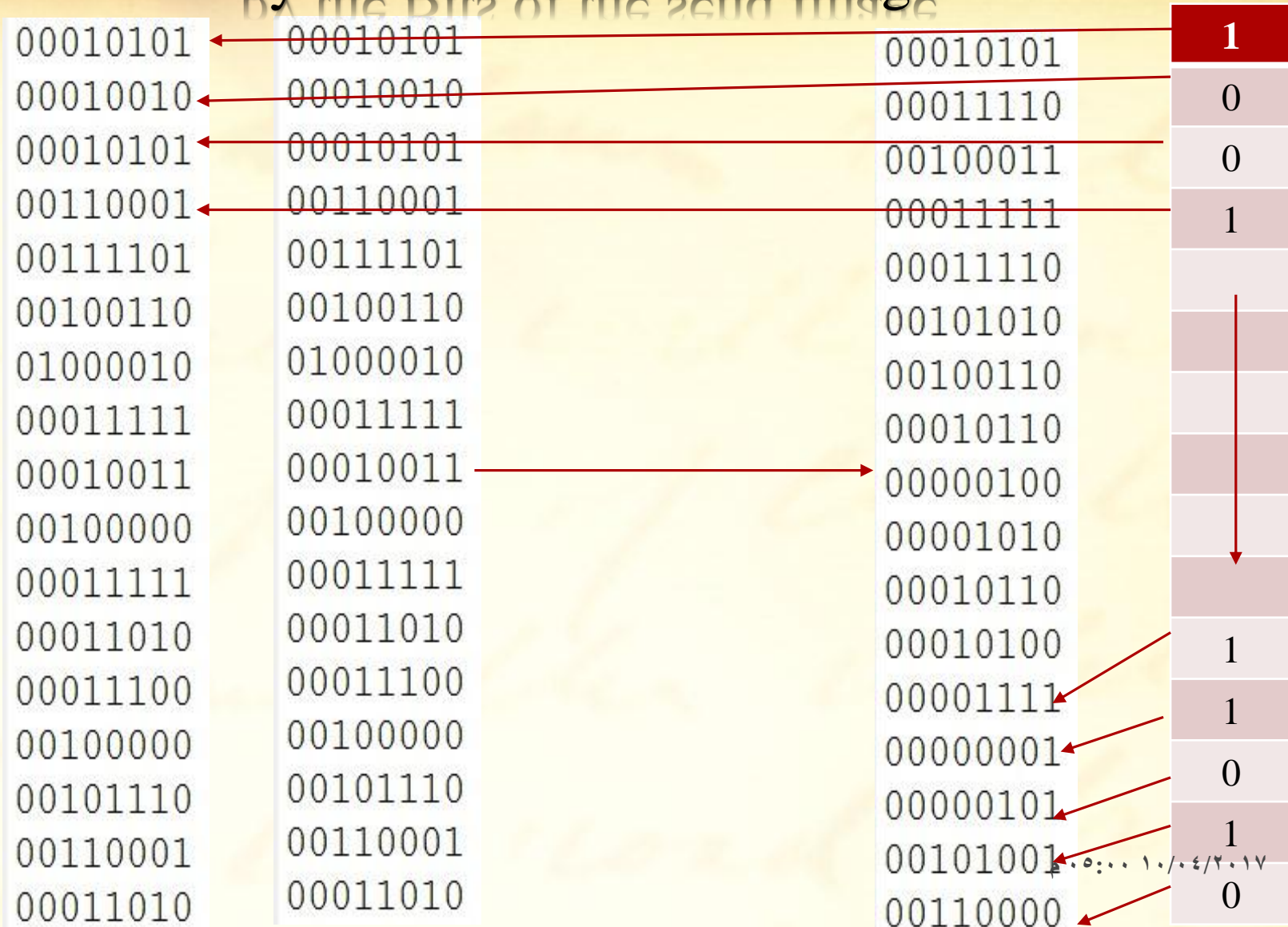
```
00010101
00010010
00010101
00110001
00111101
00100110
01000010
00011111
00010011
00100000
00011111
00011010
00011100
00100000
00101110
00110001
00011010
```

```
00010101
00010010
00010101
00110001
00111101
00100110
01000010
00011111
00010011
00100000
00011111
00011010
00011100
00100000
00101110
00110001
00011010
```

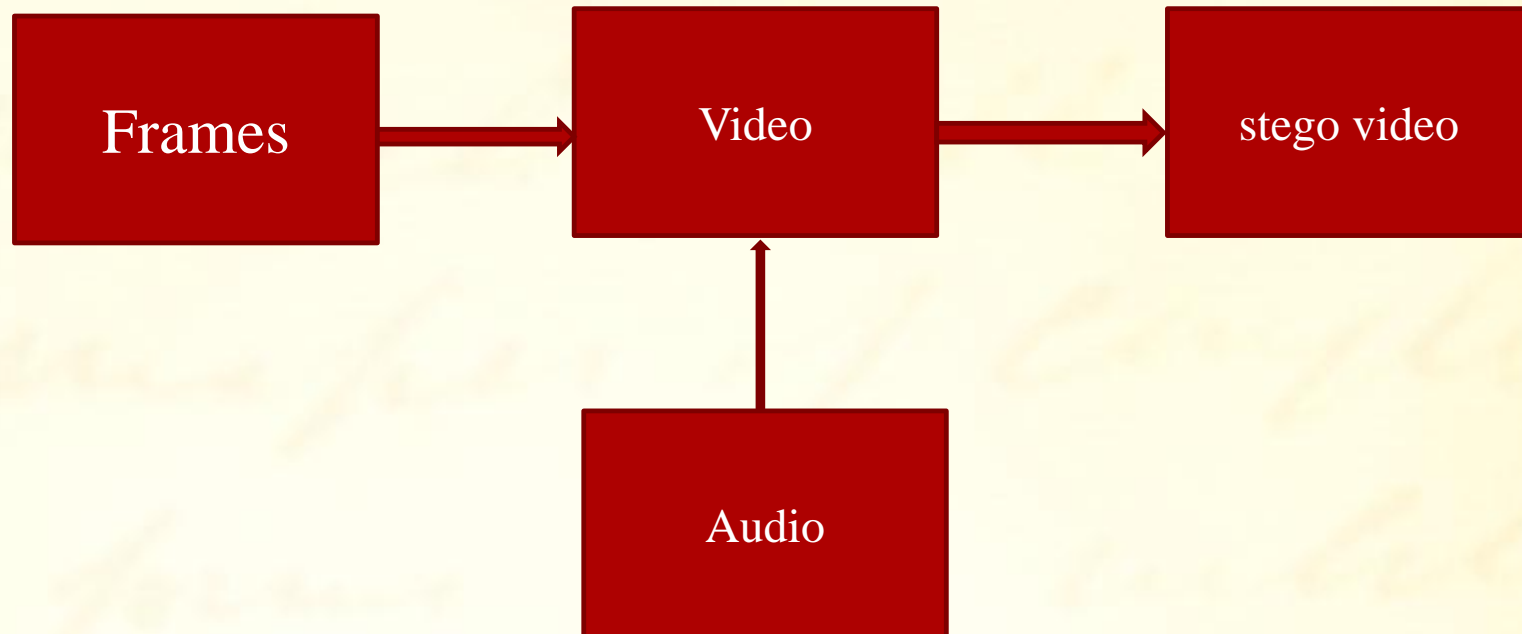


```
00010101
00011110
00100011
00011111
00011110
00101010
00100110
00010110
00000100
00001010
00010110
00010100
00001111
00000001
00000101
00101001
00110000
```

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



*Final Process at the Transmitter Side



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Thank You



Any

Questions