COMP2003J Introduction to Network Security

Soumyabrata DEV

School of Computer Science
University College Dublin
https://soumyabrata.dev/

Beijing-Dublin International College (BDIC)
29-April-2021

Course Overview

Course website is available here:
https://soumyabrata.dev/bdic.html

Home

COMP2003J Introduction to Network Security

Date: 29-April-2021

Time: 16:15 hours

Duration: 5 minutes (approximately)

Venue: Online via zoom.

Handout

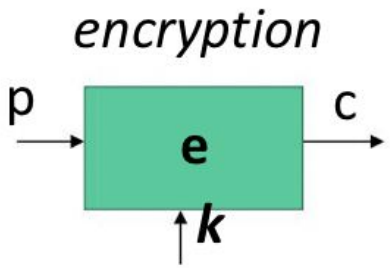
Course Slides

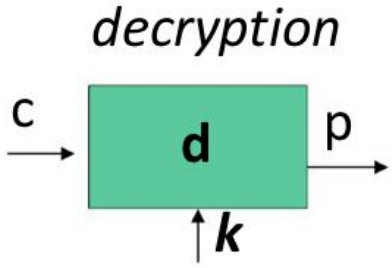
(1/3) Cryptosystem

What is a Cryptosystem?

- A cryptosystem is used to encrypt (e) the plaintext (p).
- The result of encryption is ciphertext (c).
- We decrypt (d) ciphertext to recover plaintext.
- A key (k) is used to configure a cryptosystem.

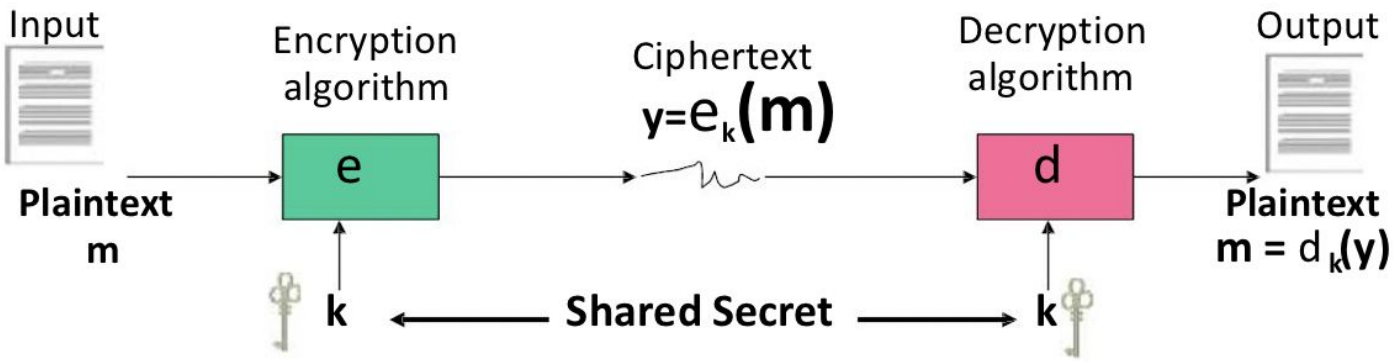
$$p = d_k(e_k(p))$$





(2/3) Symmetric Key Cryptography

Symmetric Key Cryptography



- Communicating parties share a secret key (k)
- Encryption followed by decryption, using the same key, causes the original message to be recovered [$m = d_k(e_k(m))$]
- For secrecy/confidentiality between A and B, only A and B must know the shared key (k).

(3/3) Illustration of symmetric key cryptography

One-Time Pad: Encryption

a = 000 d = 001 e = 010 h = 011 i = 100 l = 101 o = 110 v = 111

Encryption: Plaintext ⊕ Key = Ciphertext

	h	e	l	l	o	d	a	v	i	d
Plaintext:	011	010	101	101	110	001	000	111	100	001
Key:	111	101	110	101	111	100	000	101	110	000
Ciphertext:	100	111	011	000	001	101	000	010	010	001
	i	v	h	a	d	l	a	e	e	d

One-Time Pad: Decryption

a = 000 d = 001 e = 010 h = 011 i = 100 l = 101 o = 110 v = 111

Decryption: Ciphertext ⊕ Key = Plaintext

	i	**v**	**h**	**a**	**d**	**l**	**a**	**e**	**e**	**d**
Ciphertext:	100	111	011	000	001	101	000	010	010	001
Key:	111	101	110	101	111	100	000	101	110	000
Plaintext:	011	010	101	101	110	001	000	111	100	001
	h	**e**	**l**	**l**	**o**	**d**	**a**	**v**	**i**	**d**

Thank You