Project proposal

Cryptanalysis of DES

Prepared for: Jason Hinek, Doctor of Philosophy (PhD), Computer Science (Cryptography)

Prepared by: Team AbDou

November 2nd, 2016

Objective

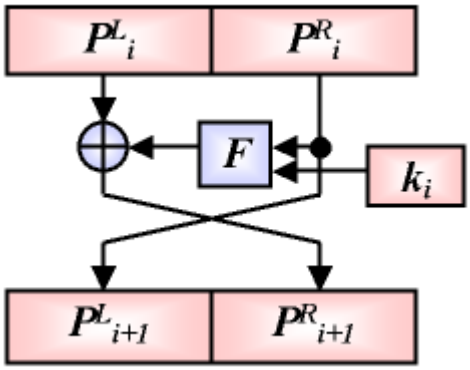
Provide an implementation of a comprehensive method to break the DES encryption in several minutes on a regular PC utilizing cryptanalysis of the DES standard and contrasting different ideas from research papers.

Goals

The main goal is to explore and understand more about the DES encryption method in depth and outline key factors noted in different differential and liquid cryptanalysis studies that were done over the past few decades. Try to implement an attack using differential cryptanalysis and show its feasibility compared to a brute-force method.

Overview

Our attack assumes we have a plaintext-ciphertext pair and that we are trying to determine the key. Each of the 16 rounds can be described as follows: the input to each round is broken into 32-bit halves, only the left half is modified in each round. Also, for each round, a different 48-bit subkey is derived from the 56-bit key. This is the basis of Shamir and Biham's attack. Pictured on the right is one iteration through one of the 16 rounds.



Resources

1.Eli Biham, Adi Shamir :Differential Cryptanalysis of the Full 16-round DES (2007)
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.720.215&rep=rep1&type=pdf

2. Cetin Kaya Koc :Differential Cryptanalysis
http://cs.ucsb.edu/~koc/ccs130h/notes/dc1.pdf

3.Eli Biham, Adi Shamir : Differential Cryptanalysis of DES- like Cryptosystems (1990)
http://www.cs.bilkent.edu.tr/~selcuk/teaching/cs519/Biham-DC.pdf

4.Howard M. Heys :A Tutorial on Linear and Differential Cryptanalysis
https://www.engr.mun.ca/~howard/PAPERS/ldc_tutorial.pdf

5. Eli Biham, Adi Shamir : Differential Cryptanalysis of the Data Encryption Standard
http://www.cs.technion.ac.il/~biham/Reports/differential-cryptanalysis-of-the-data-encryption-standard-biham-shamir-authors-latex-version.pdf