Cryptology

Basic Terminology

- plaintext original message
- ciphertext coded message
- cipher algorithm for transforming plaintext to ciphertext
- key info used in cipher, known only to sender/receiver
- encipher (encrypt) converting plaintext to ciphertext
- decipher (decrypt) recovering ciphertext from plaintext
- cryptography study of encryption and decryption principles/methods
- cryptanalysis (codebreaking) study of principles/ methods of deciphering ciphertext without knowing key
- cryptology field of both cryptography and cryptanalysis

Cryptography Ciphers

- Plaintext can be encrypted through stream cipher or block cipher.
- Stream cipher: each plaintext bit transformed into ciphertext bit, one bit at a time
- Block cipher: message divided into blocks (e.g., sets of 8- or 16-bit blocks) and each is transformed into encrypted block.

Cryptography Techniques

Symmetric Cryptography:

If

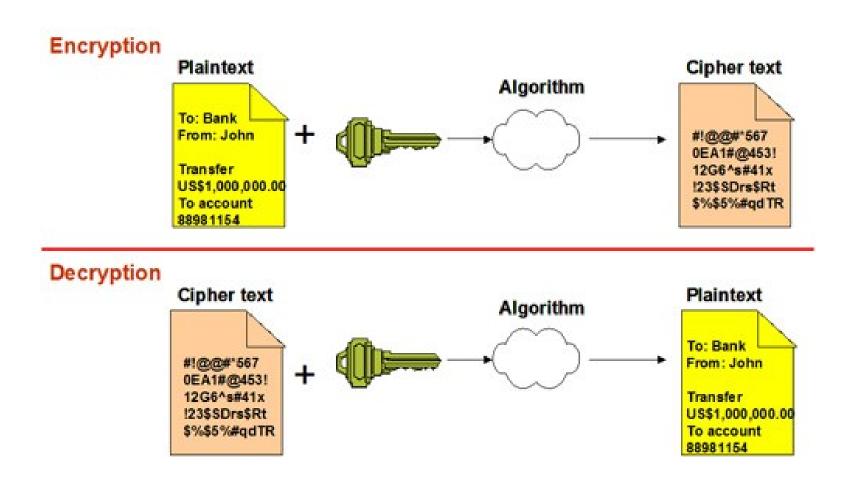
Encryption key = Decryption Key (same)

Asymmetric Cryptography:

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Encryption key # Decryption Key (different)

Cryptography Techniques



Cipher Types

1. Block Cipher:

Message will be divided into blocks, for example 64 bits and the encryption process will take place on each block.

2. Stream Cipher:

Encryption process will take place on each bit with the key bit

Block Cipher

1. Substitution Cipher:

- A technique in which the letters of plaintext are replaced by other letters or symbols.
- Position of a letter is fixed but its value will be changed.

2. Transposition Cipher:

- Value of a letter is fixed but its position is changed.

3. Product Cipher:

- Value and position of a letter are changed.

Substitution Cipher

Mono-alphabetic cipher

A cipher that uses fixed substitution over the entire message.

Poly-alphabetic cipher

A cipher that uses a number of substitutions at different positions in the message.

Cryptography Key Size

- When using ciphers, size of the cryptography key very important
- Strength of many encryption applications and cryptosystems measured by the key size
- For cryptosystems, security of encrypted data is not dependent on keeping cryptography algorithm secret
- Cryptosystem security depends on keeping some or all of elements of key(s) secret