What is Cryptography?

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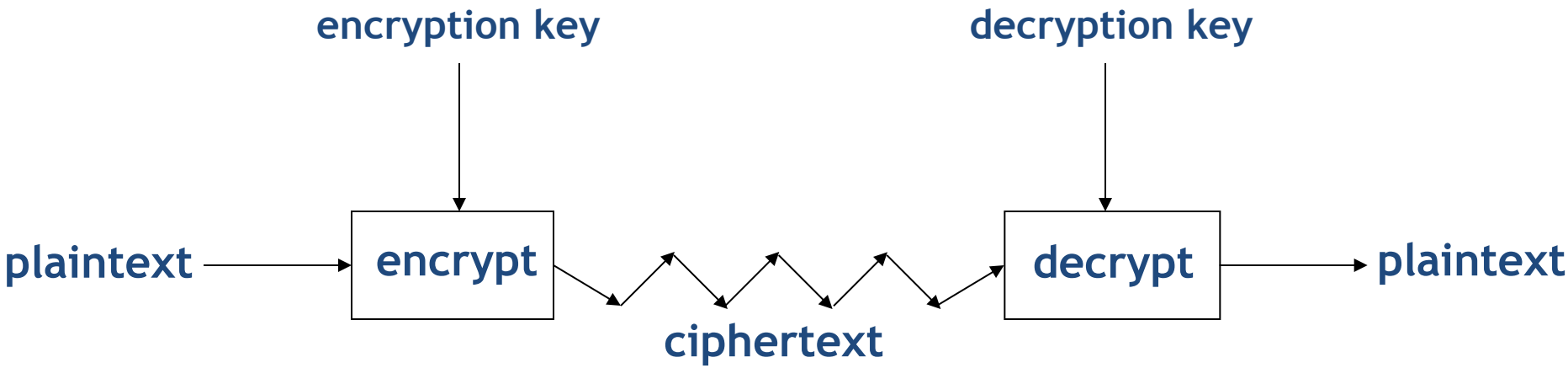
Cryptography

"secret" "writing"

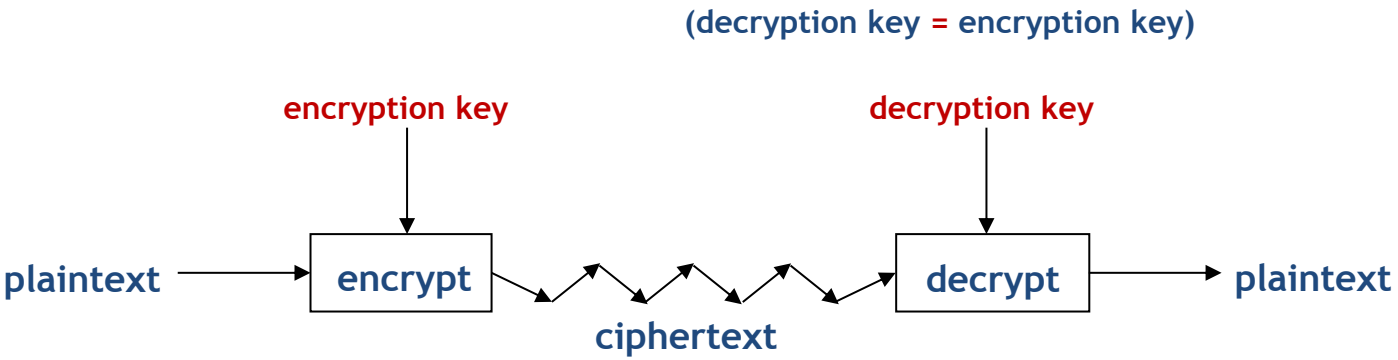
Crypto as black box



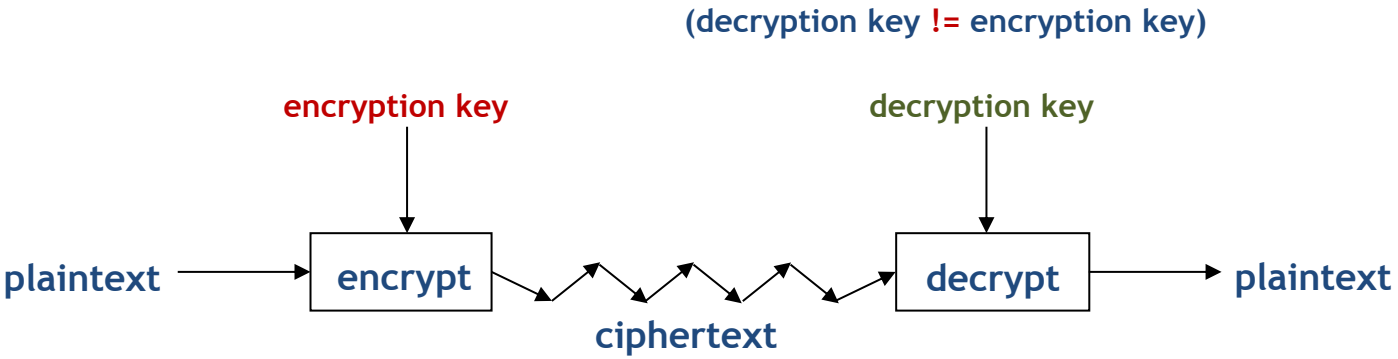
Tools for confidentiality and Integrity

Types of crypto systems

- Symmetric



- Public or Asymmetric



A framework for crypto

- Cryptography (making), cryptanalysis (breaking), cryptology (both)
- Traditional cryptanalysis – what goes wrong with the design of the algorithms
- Then – what goes wrong with their implementation (power analysis, timing attacks)
- Then – what goes wrong with their use

How to speak Crypto

- A *cipher* or *cryptosystem* is used to *encrypt* the *plaintext*
- The result of encryption is *ciphertext*
- We *decrypt* ciphertext to recover plaintext
- A *key* is used to configure a cryptosystem
- A *symmetric key* cryptosystem uses the same key to encrypt as to decrypt
- A *public key* cryptosystem uses a *public key* to encrypt and a *private key* to decrypt

Things to remember

- Cryptography is:
  - a tremendous tool
  - the basis for many security mechanisms
- Cryptography is not:
  - the solution to all security problems
  - reliable unless implemented and used properly
  - something you should try to invent yourself
    - » too many examples of broken ad-hoc designs

“If you think cryptography is the answer to your problem, you don’t know what your problem is.”

Peter G. Neumann

Three steps in cryptography

1. Precisely specify a threat (or attack) model
2. Propose a construction
3. Prove that breaking construction under the threat model will solve an underlying hard problem (security proof)

Questions?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