Basic Scenario of Cryptography

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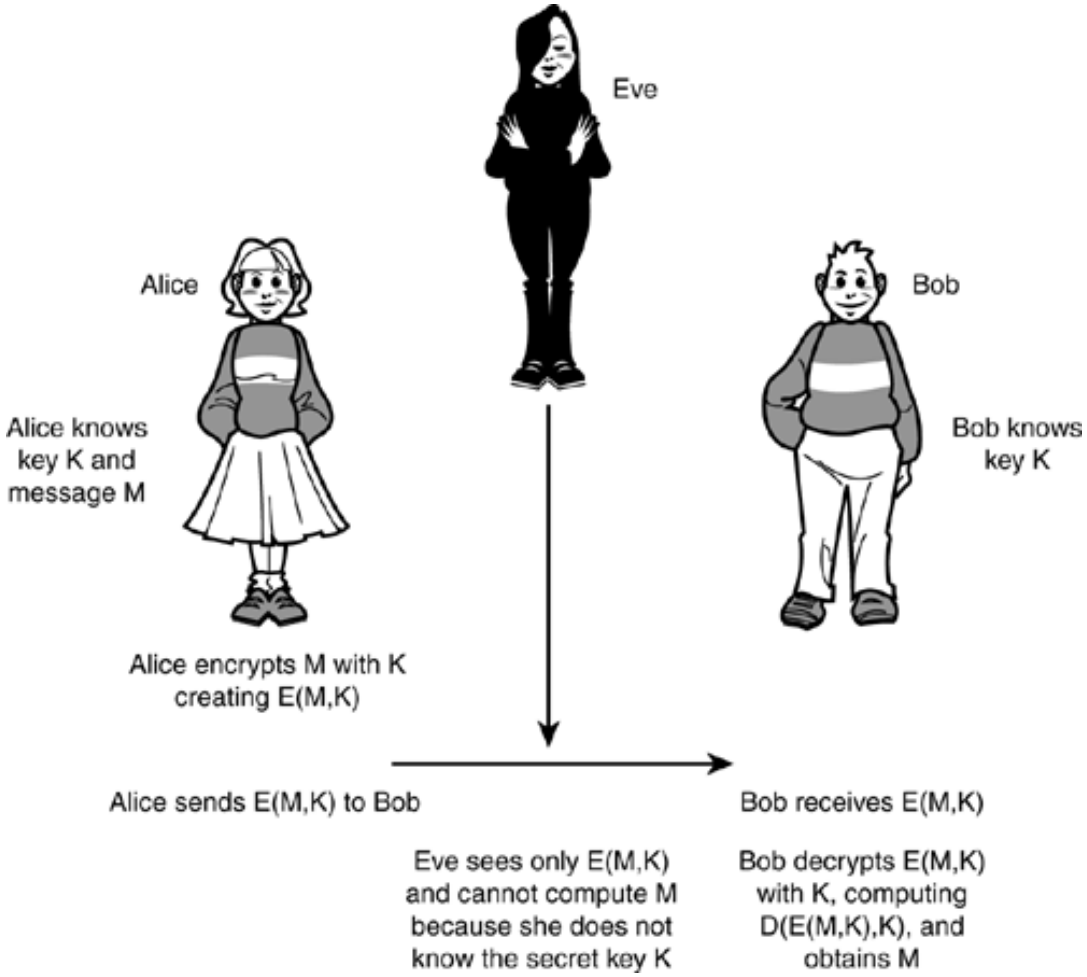
- Alice, who wants to say something privately to Bob
- Bob, who wants to hear from Alice
- Eve, the person who is trying to eavesdrop on their conversation.
  Eve's goal:
  - Read M
  - Get the Key Alice is using, and real all messages encrypted using that key
  - Modify the content of the message in such a way that Bob will think Alice sent the altered message.
  - Impersonate Alice and communicate with Bob who thinks he is communicating with Alice.

Passive

Active



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Terminologies of Cryptography

- **Cryptography: the art of secret writing**
  - The art of mangling information into apparent unintelligibility in a manner that allows a secret method of unmangling.
- **Related terminologies**
  - Cryptology: The study of communication over non-secure channels, and related problems
  - Cryptography: The process of designing systems that achieve secure communications.
  - Cryptanalysis: Breaking such systems. (The techniques used to recover the secret information hidden in cryptographic systems)
  - Plaintext: message to be sent, in readable form
  - Ciphertext: message in coded form, unreadable without special information such as a key
  - Encrypt: turn plaintext into ciphertext
  - Decrypt: turn ciphertext back into plaintext

Cryptosystem attacks

- Ciphertext-only attack
- Known-plaintext attack
- Chosen-plaintext attack
- Chosen-ciphertext attack

Ciphertext-only attack - Example

In this attack on the encryption, attacker/cryptanalyst can only observe the ciphertext.

```
hQIMAw3Jn/nLK/38ARAAsSXLDhCtzUYKMptNxZImJXwhhIRm3QxfuyHjJ93ASylE
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E5zYe1wUgtwS/lmQ2w5PQF/89bpshtDSYuL1fZgzrsE6DwophuCri5zwCGbEKlsI
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T/MCxI0bZHCUhPupEKT8slbSrDNxTWMUXQt3XpL0bGCCrDMKLSoWYfDiNnRkFbWK
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```
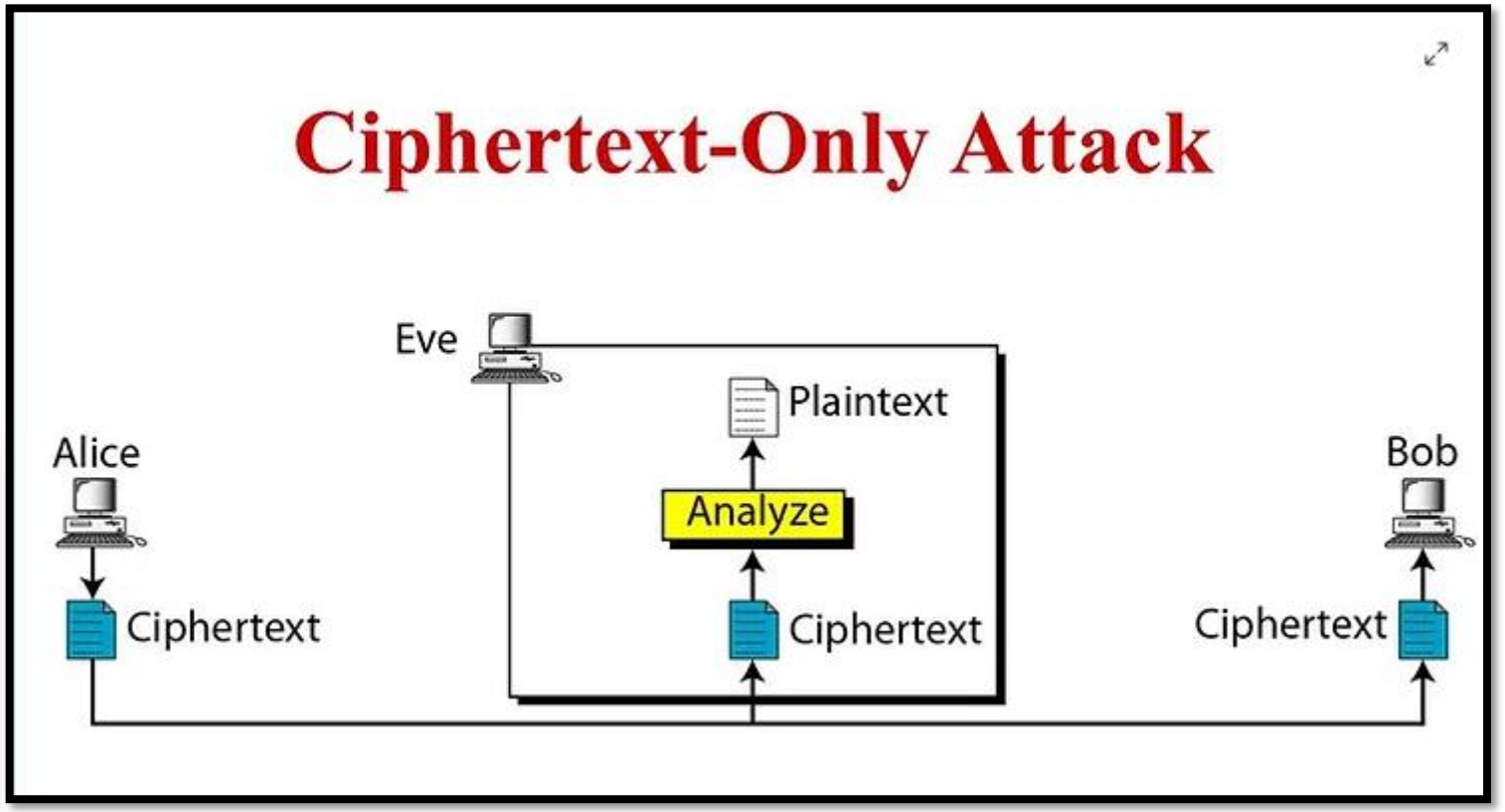
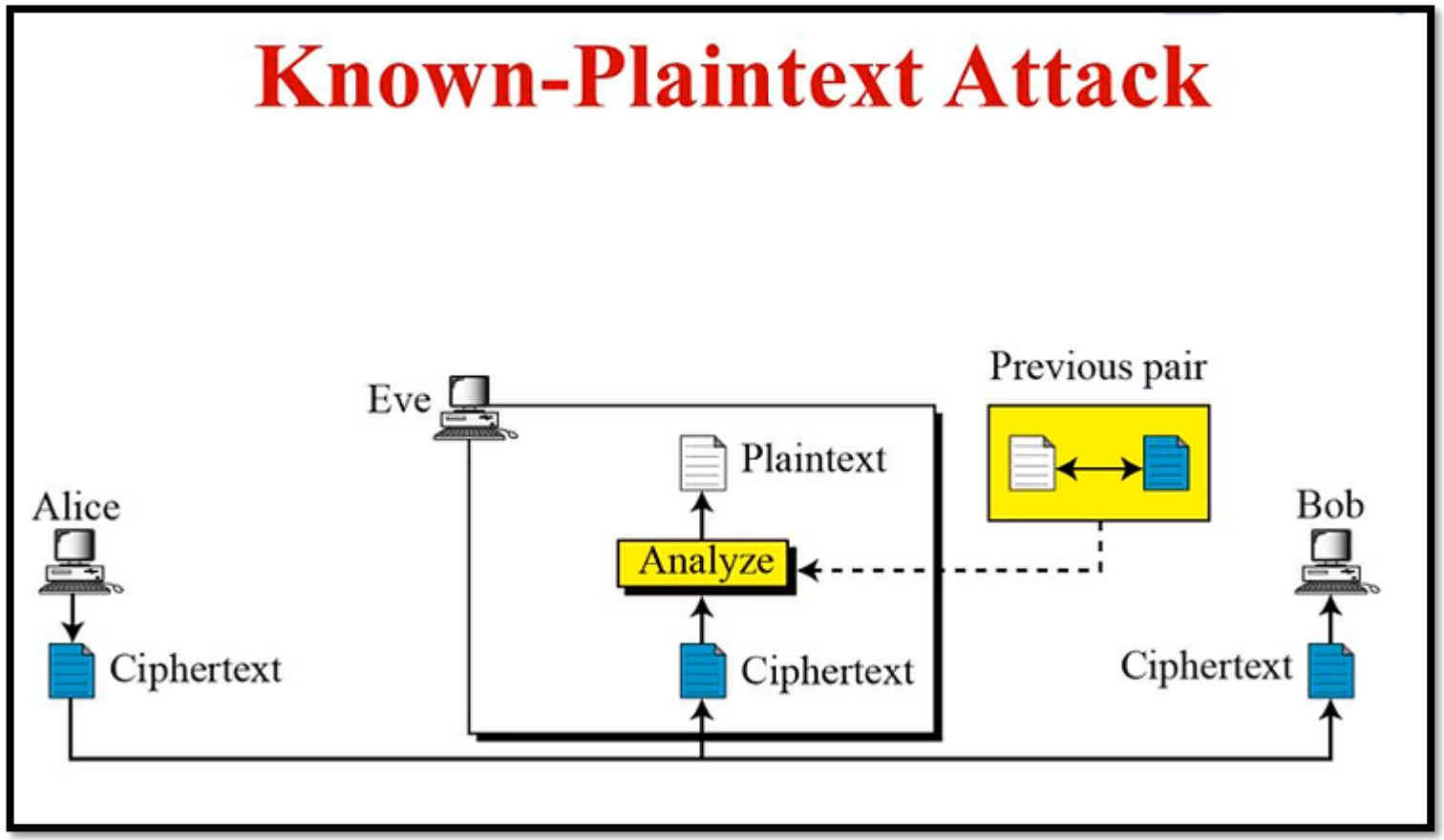



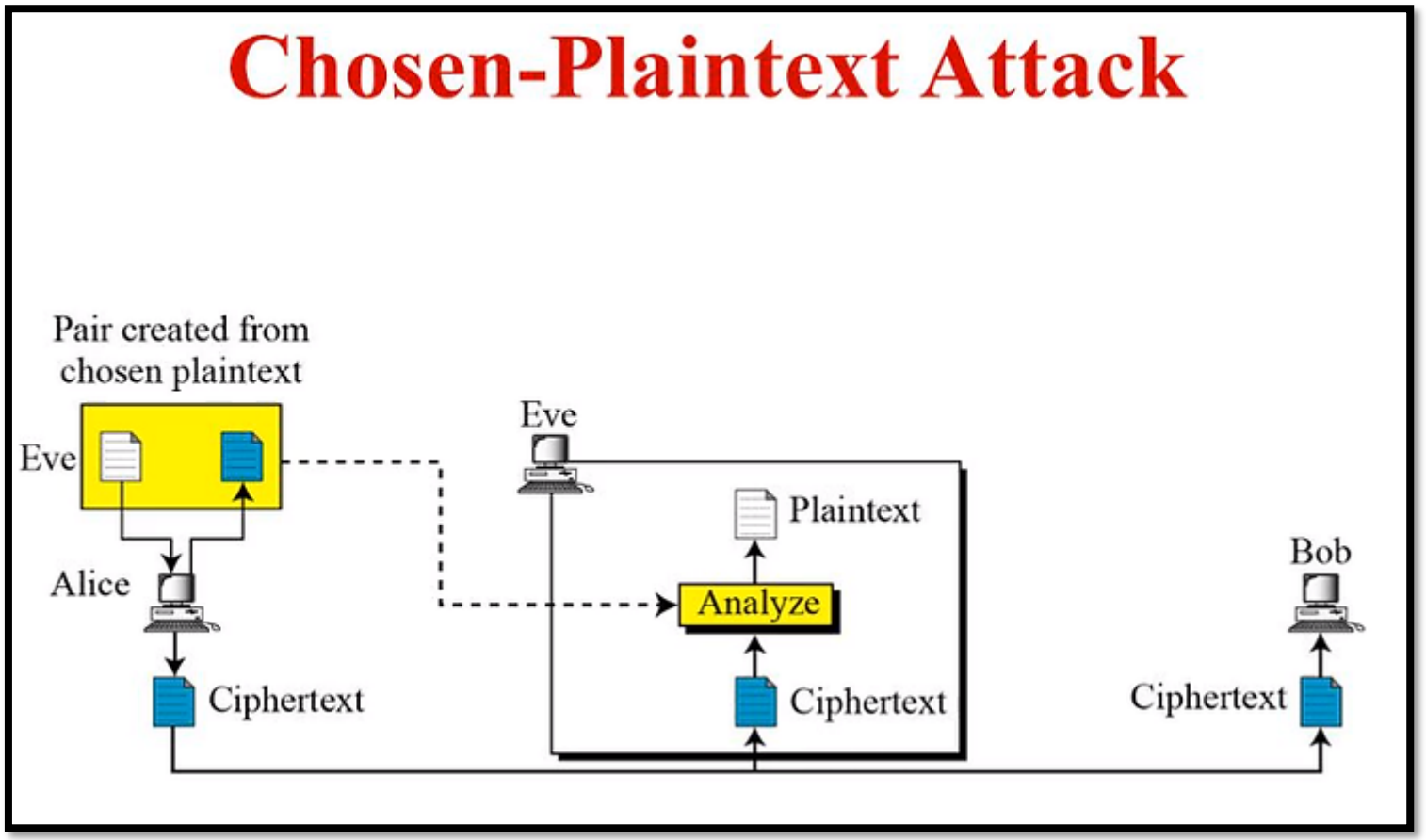
Known-plaintext attack - Example

- In this attack, the attacker/cryptanalysts know the plaintext that generates the ciphertext. They can't select the plaintext, but they can observe plaintext-ciphertext pairs.
- This attack has a significantly better chance of success than COA.



Chosen-plaintext attack - Example

- In this attack, the cryptanalyst can select or choose the plaintext that is sent through the encryption algorithm and observe the ciphertext that it generates.
- An active model where the attacker actually gets to chose the plaintext and do the encryption.



Chosen-ciphertext attack - Example

In this attack, the attacker can both encrypt and decrypt. This means that they can select plaintext, encrypt it, observe the ciphertext and then reverse the entire process.