# Computer Networks Homework #11

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# Exercise Exam + Q&A

- Exercise exam
  - Available in wiki
  - Intended for self-study; there will be no answer sheet or exercise session
- Question and Answer Session
  - Entirely for your benefit!
  - Please send us an email(yshao@gwdg.de) of your question before Feb. 6 2020 and we will replay in time

# 1 -- NetSec

- What are the security concerns network security is targeting at? What main areas of protection does network security cover?

# 1 -- NetSec

- Confidentiality: only sender, intended receiver should “understand” message contents
- Authentication: sender, receiver want to confirm identity of each other
- Message integrity: sender, receiver want to ensure message not altered (in transit, or afterwards) without detection
- Access and availability: services must be accessible and available to users

# 2 -- Cryptography

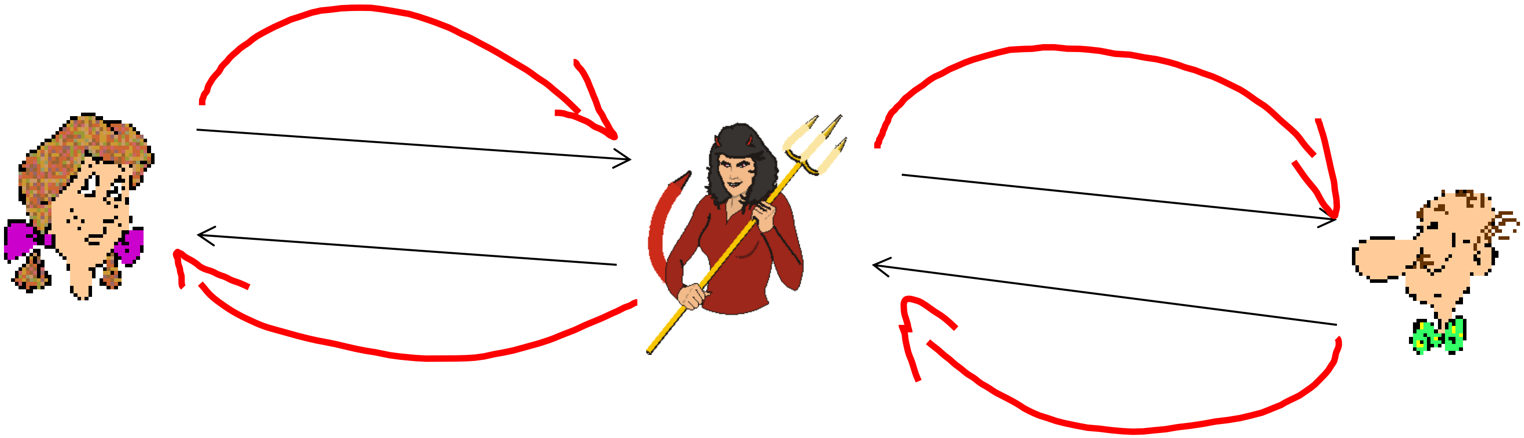
- What are the two main types of cryptography regarding Keys' type?

- Symmetric crypto (encryption + decryption with the same key): DES, 3DES, AES etc.

- Asymmetric crypto (enc and dec with different keys): RSA, Public/Private keying, Diffie-Hellman

# 3 -- Authentication

- What is a man-in-the-middle attack? Is public key cryptography save against that type of attack?



- Asymmetric keying only helpful if public keys are pre-known or certificate bound.

# 4 -- Authentication

- What other tricks does attackers use to overcome authentication protection? Please explain using the AP protocols presented in the lecture.

- AP 1.0/2.0 Just faking IDs (“I am Alice”) or spoofing an IP address
- Often record and playback attacks as in AP 3.0/3.1

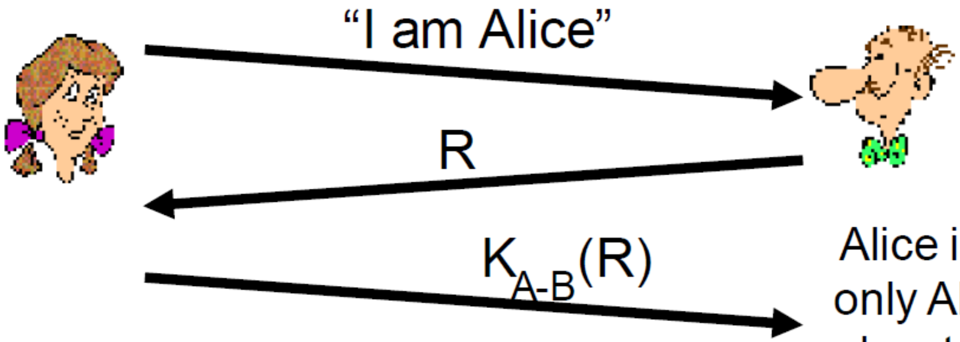
# 5 -- Nonces

- What is the purpose of a nonce in an end-point authentication protocol?

Goal: avoid playback attack

Nonce: number (R) used only *once –in-a-lifetime*

ap4.0: to prove Alice “live”, Bob sends Alice a nonce, R. Alice must return R, encrypted with shared secret key



“I am Alice”

R

$K_{A-B}(R)$

Alice is live, and only Alice knows key to encrypt nonce, so it must be Alice!

Failures, drawbacks?

# 6 -- Hashes

- What is the conceptual difference between a crypto-hash function and other hash functions?

1. Every cryptographic hash function is a hash function. But not every hash function is a cryptographic hash.

2. A cryptographic hash function aims to guarantee a number of security properties.

3. Non cryptographic hash functions just try to avoid collisions for non malicious input.

# 7 – Authenticate Big Messages

Alice wants to send a big message (~ 1Gb) toBob. Explain how she can authenticate herself. Is there a more efficient way to do it?

1. Alice: $M_C=K^-_A(M)$ → Bob: $K^+_A(M_C)$
2. Alice: $[M_C=K^-_A(H(M))]+M$ → Bob: $K^+_A(M_C)$ and H(M)

# 8 – Secure Big Messages

1. Alice: $M_C=K^+_B(M)$ → Bob: $K^-_B(M_C)$
2. Efficient Way
   1. Share a symmetric key ($K_S$) using public key:

      Alice: $K^+_B(K_S)$ → Bob: $K^-_B(K_S)$
   2. Send big message using shared symmetric $K_S$

      Alice: $M_C=K_S$ (M) → Bob: $K_S(M_C)$

# Thank you

Any questions?