CNT4406/5412 Network Security

Real-time Communication Security

Zhi Wang

Florida State University

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Introduction

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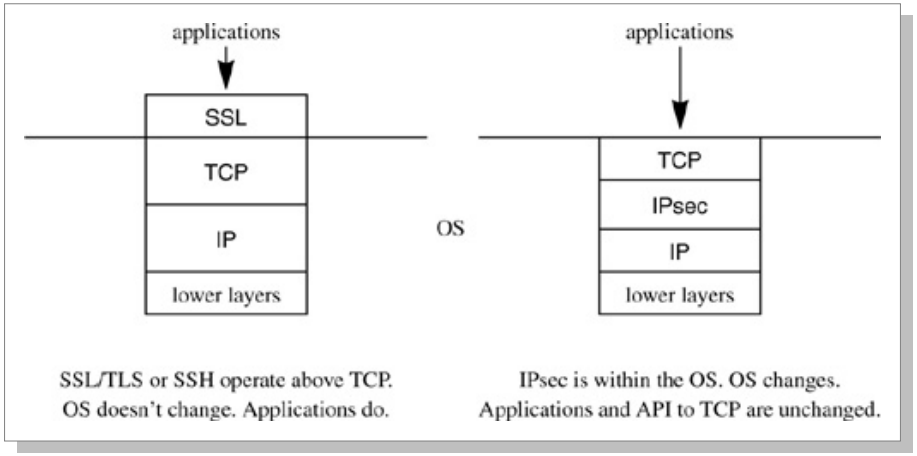
- e.g., IPsec, SSL/TLS, and SSH
  - What layer?
  - Perfect forward secrecy
  - Denial-of-service protection
  - Endpoint identifier hiding
  - Live partner reassurance
  - Session resumption
  - Plausible deniability

What Layer?

- IP stacks (i.e., TCP/UDP/IP...) are implemented in the OS kernel



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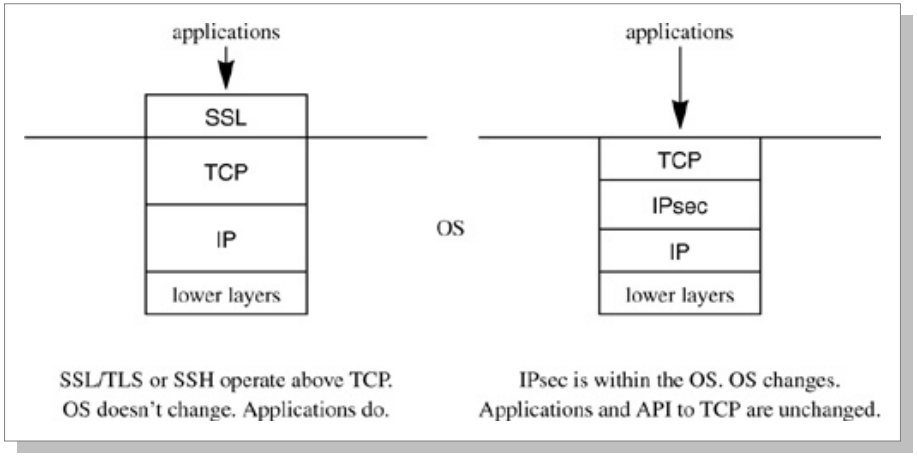

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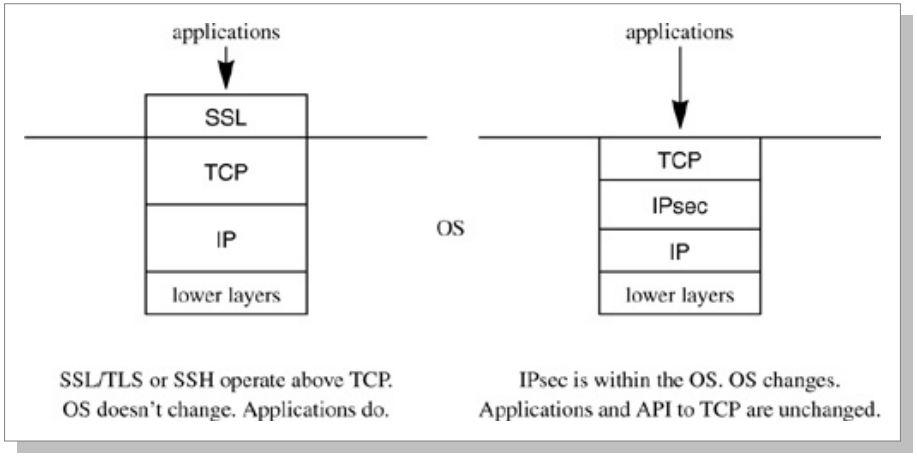

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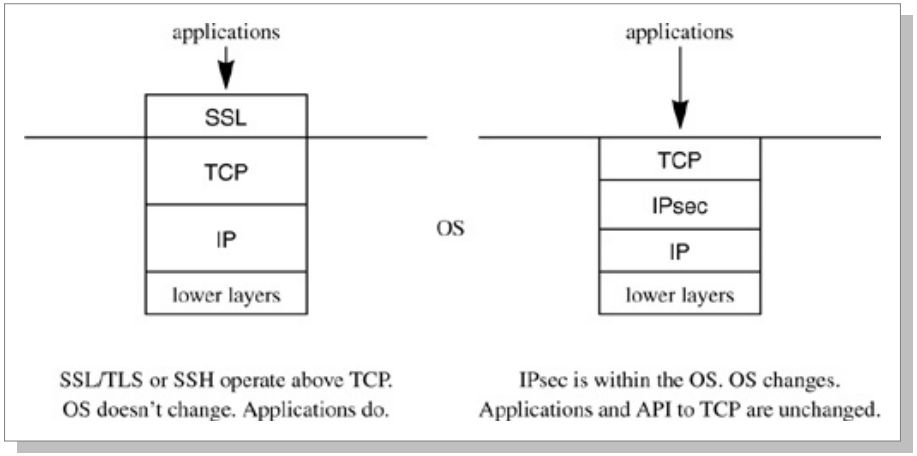
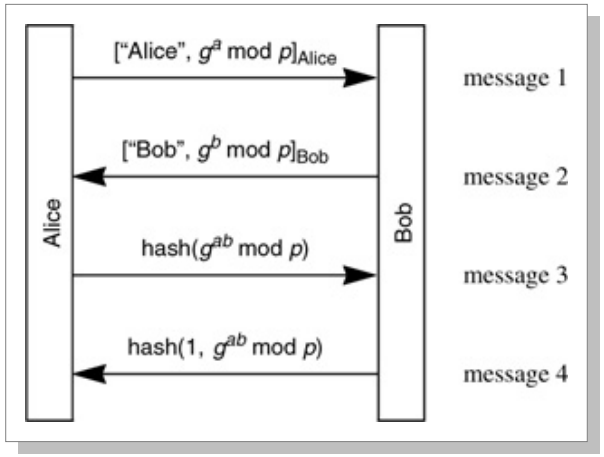
  - ➠ changes are necessary to take full advantage of IPSec
    e.g., to authenticate a user instead of the IP address



Perfect Forward Secrecy

Perfect forward secrecy: it is impossible for Trudy to decrypt a recorded conversation even she subsequently steals all parties' long-term secrets



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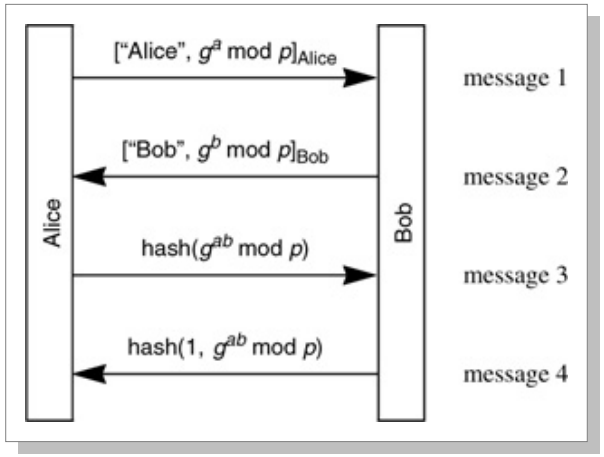

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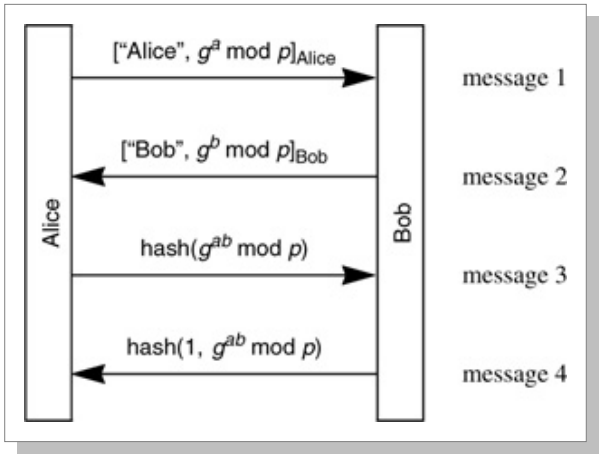

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- Alice and Bob communicate using the session key issued by a KDC
- Alice picks a session key, encrypts it with Bob's public key, then signs and sends it to Bob

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To protect against DoS, avoid significant computation or saving states until the initiator is proved to be reachable

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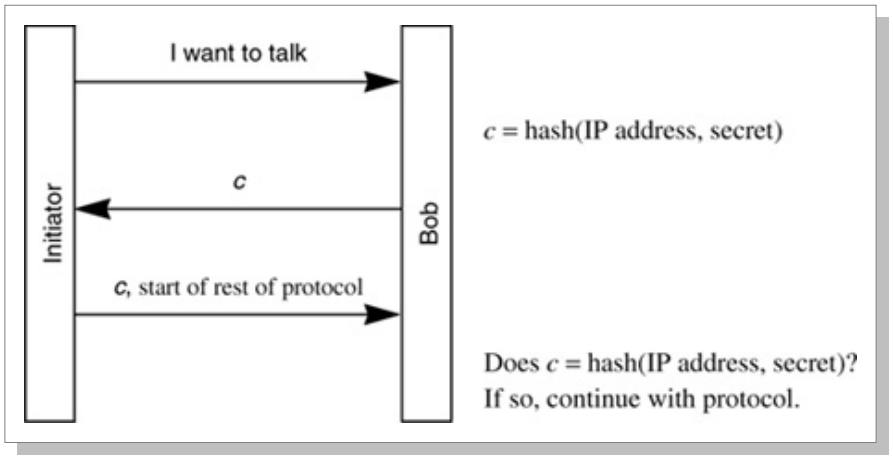

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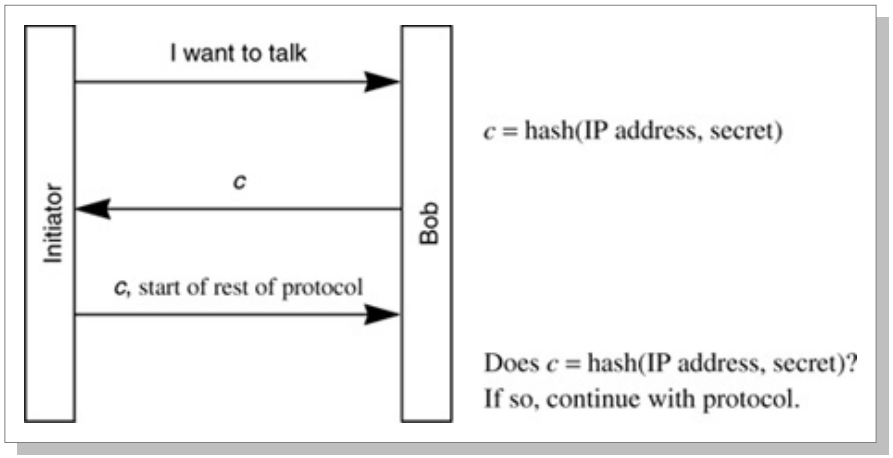

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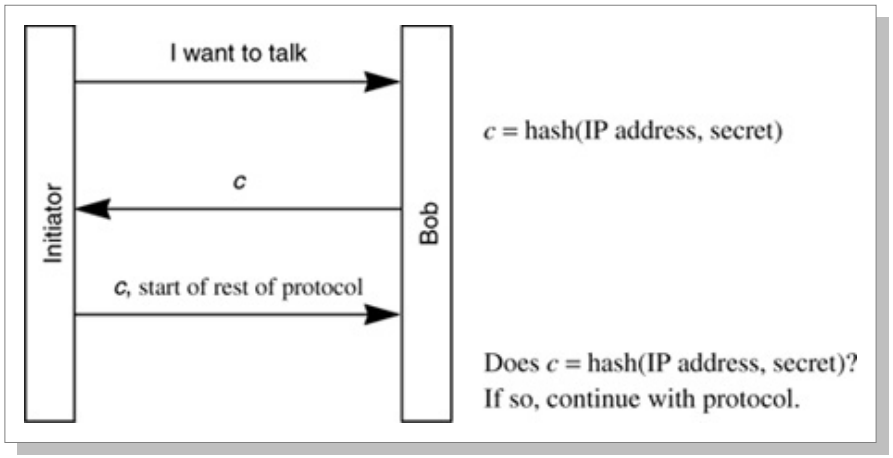

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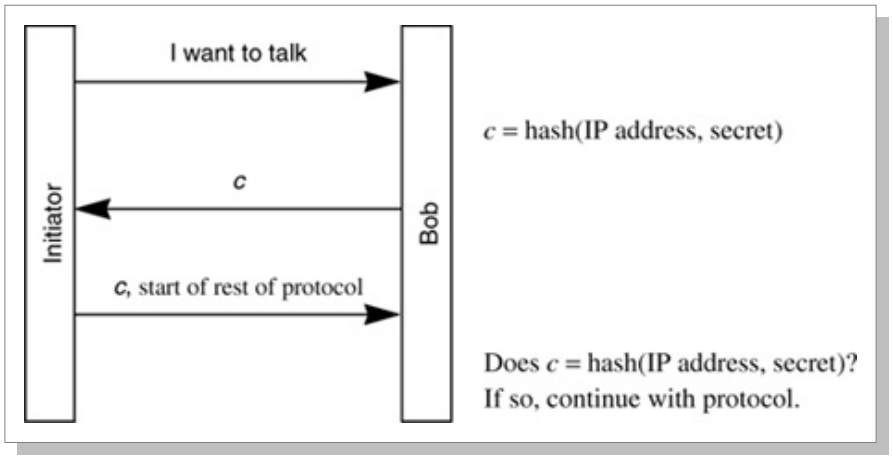
- Bob verifies the cookie by recomputing it ➠ no need to save states



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  - not effective against distributed DoS (e.g., botnet)

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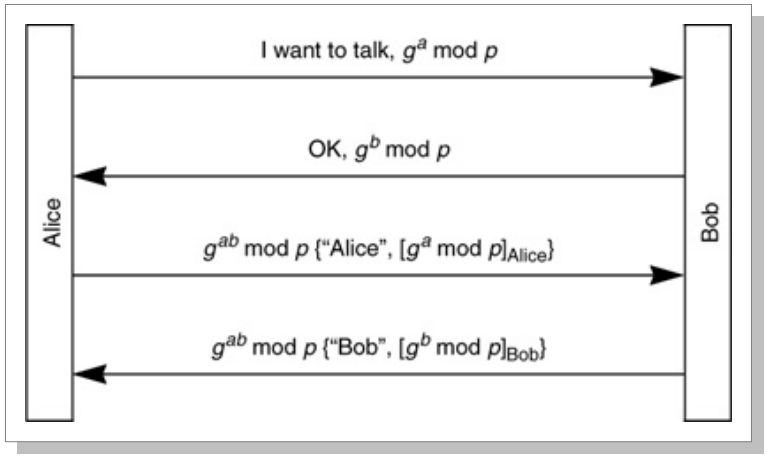

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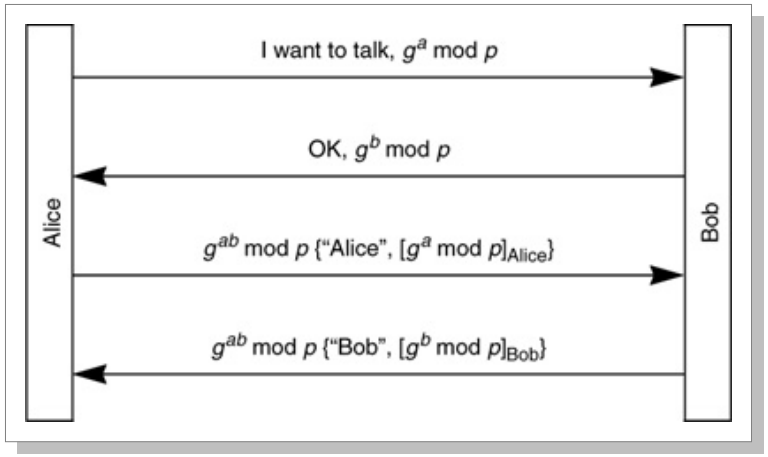
  - ➠ active attackers doing MITM can learn one or both identities



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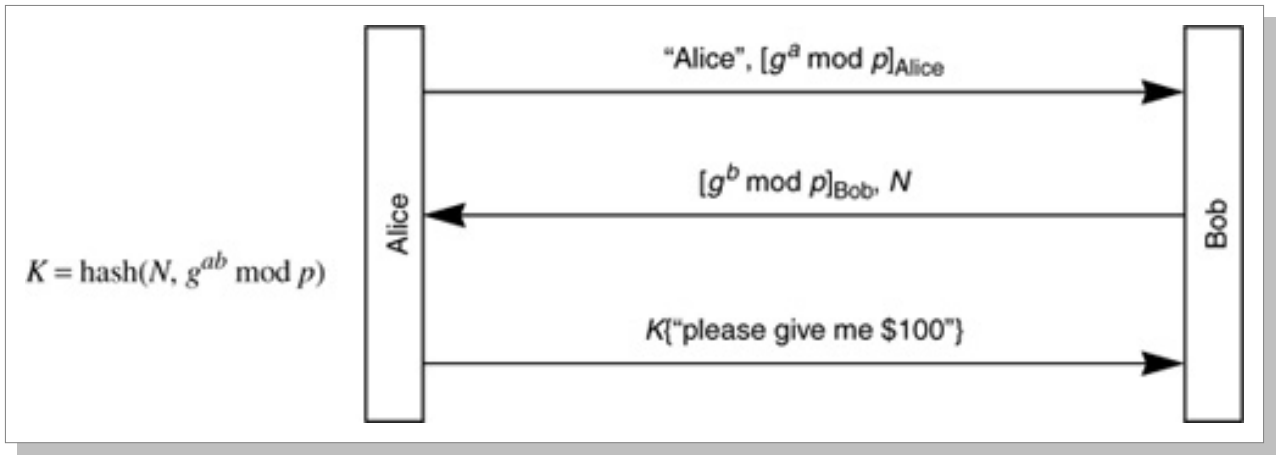

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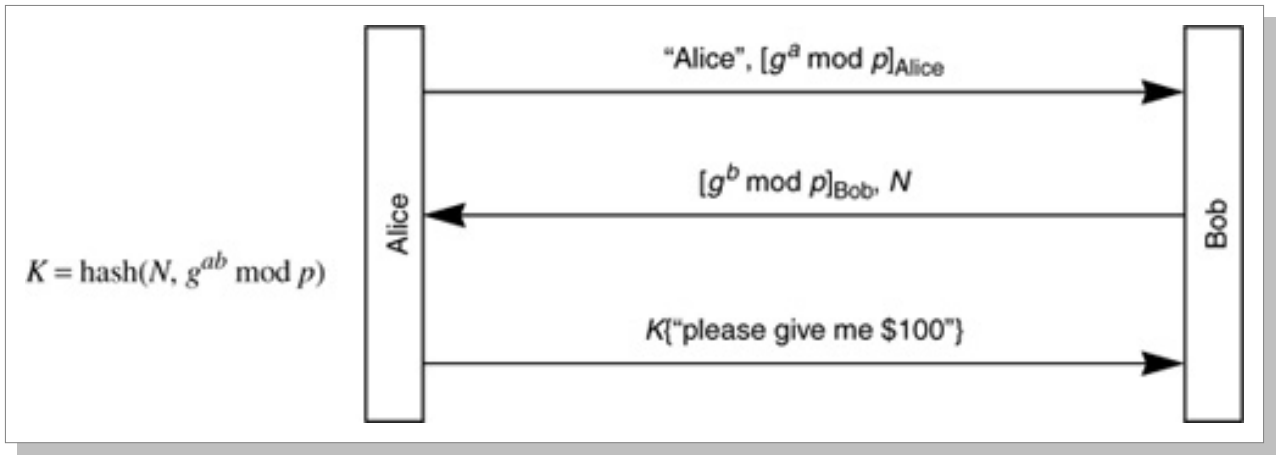

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  - otherwise, Bob verifies and decrypts X_{ab} to get S

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- Alice and Bob authenticate by signing the other's identity?
  ➠ no, only Alice or Bob can access its signature key

Summary

- What layer?
- Perfect forward secrecy
- Denial-of-service protection
- Endpoint identifier hiding
- Live partner reassurance
- Session resumption
- Plausible deniability

- Next lecture: IPSec