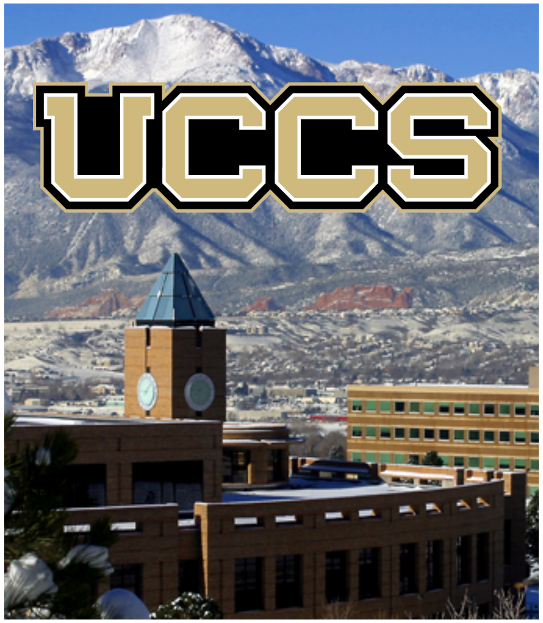


Cryptographic Hash and Integrity Protection

Digital Signature

Sang-Yoon Chang, Ph.D.

Module: Digital Signature

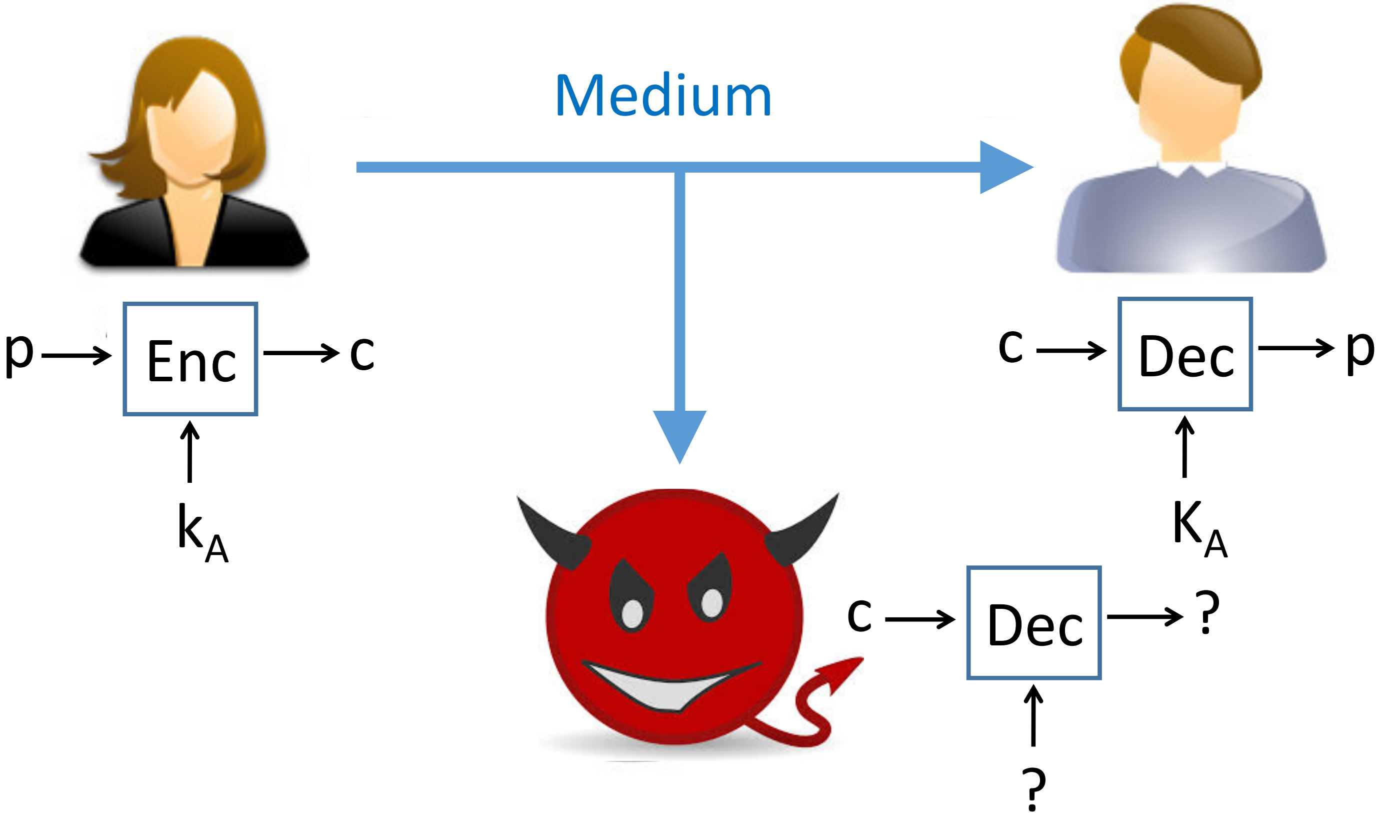
Asymmetric Cryptography and Integrity

Digital Signature Objectives

Digital Signature Requirements

Digital Signature Construction,
e.g., RSA and DSS

Asymmetric: Alice uses Alice's private key k_A



Medium

p → Enc → c

k_A

c → Dec → p

K_A

c → Dec → ?

?

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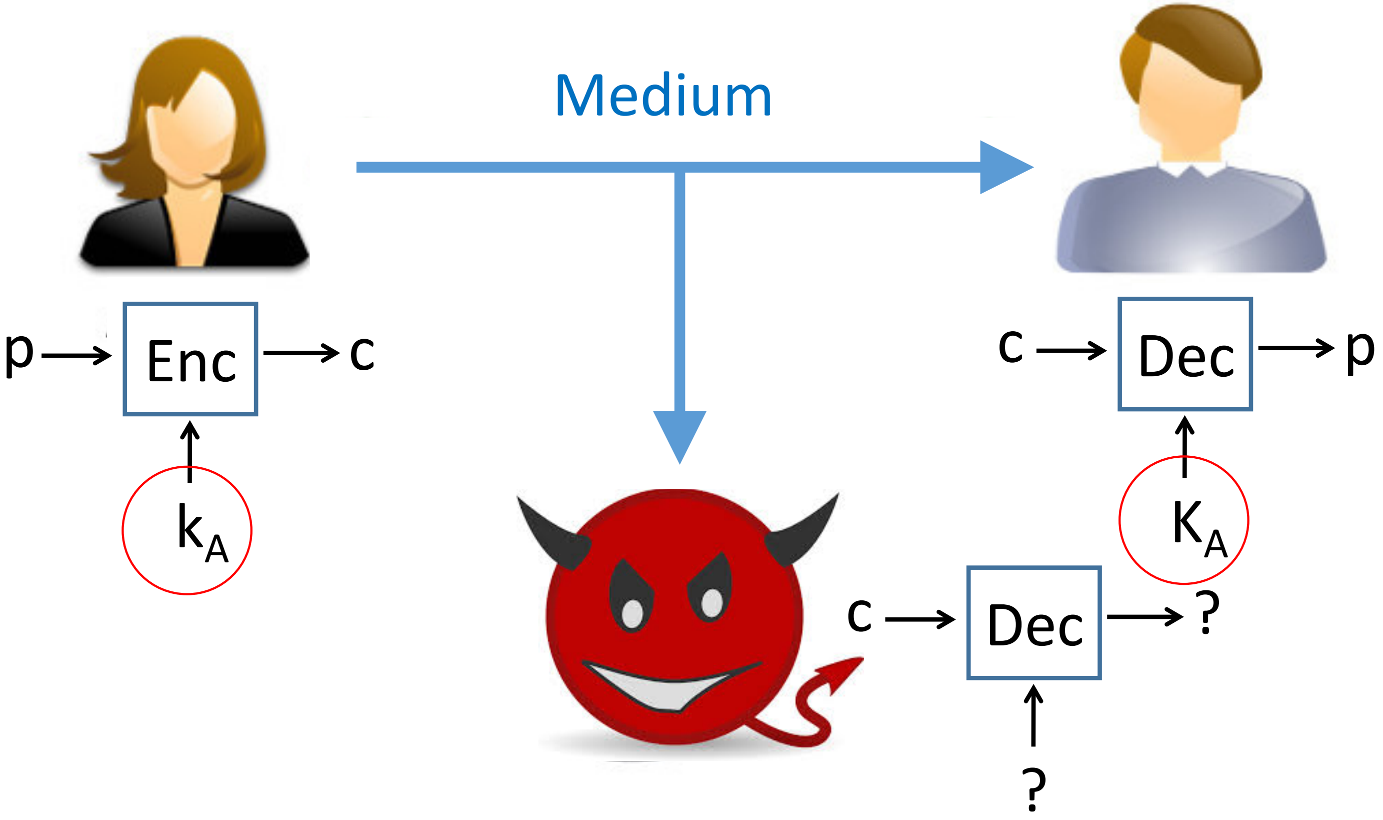

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K_A

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?

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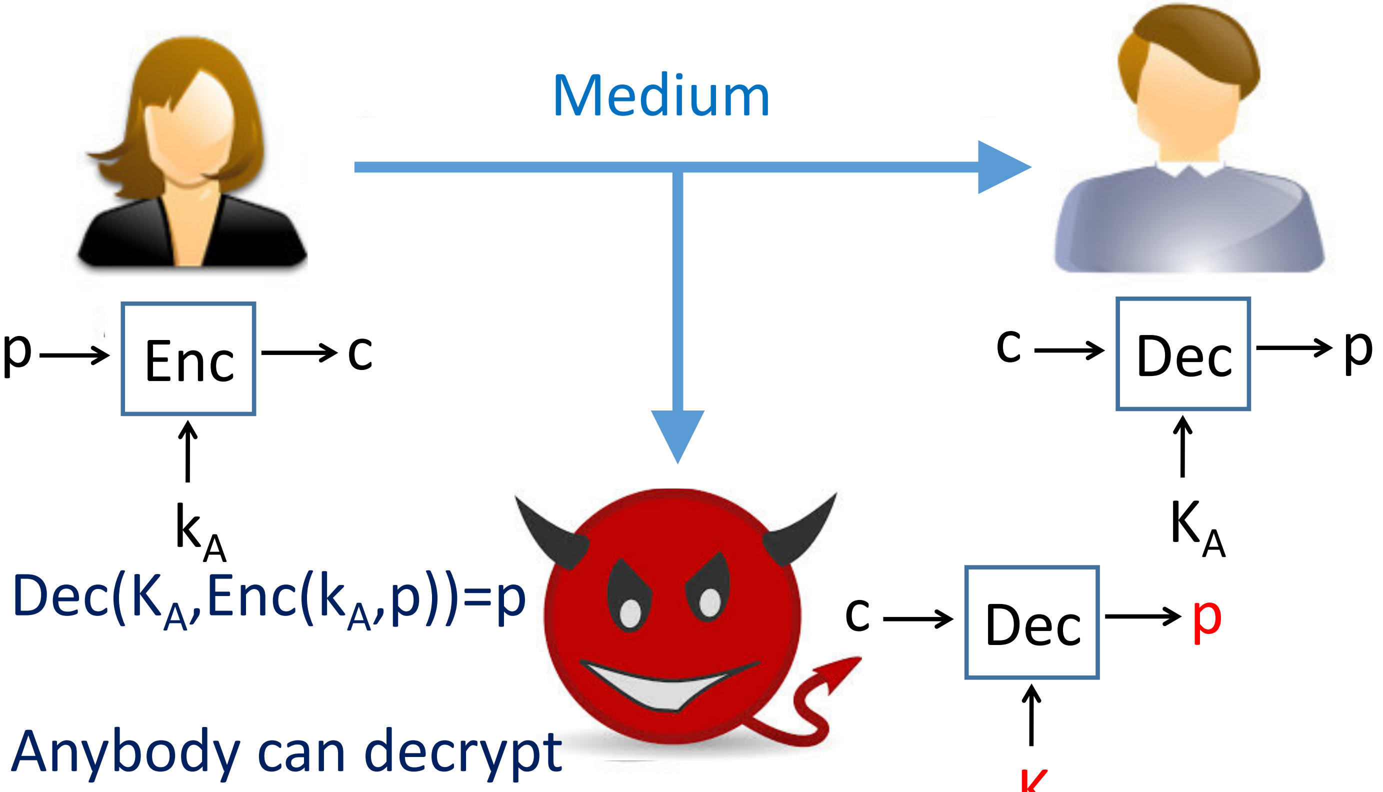

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k_A

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K_A

c → Dec → p

K_A

$Dec(K_A,Enc(k_A,p))=p$

Anybody can decrypt

But only Alice can encrypt => Integrity

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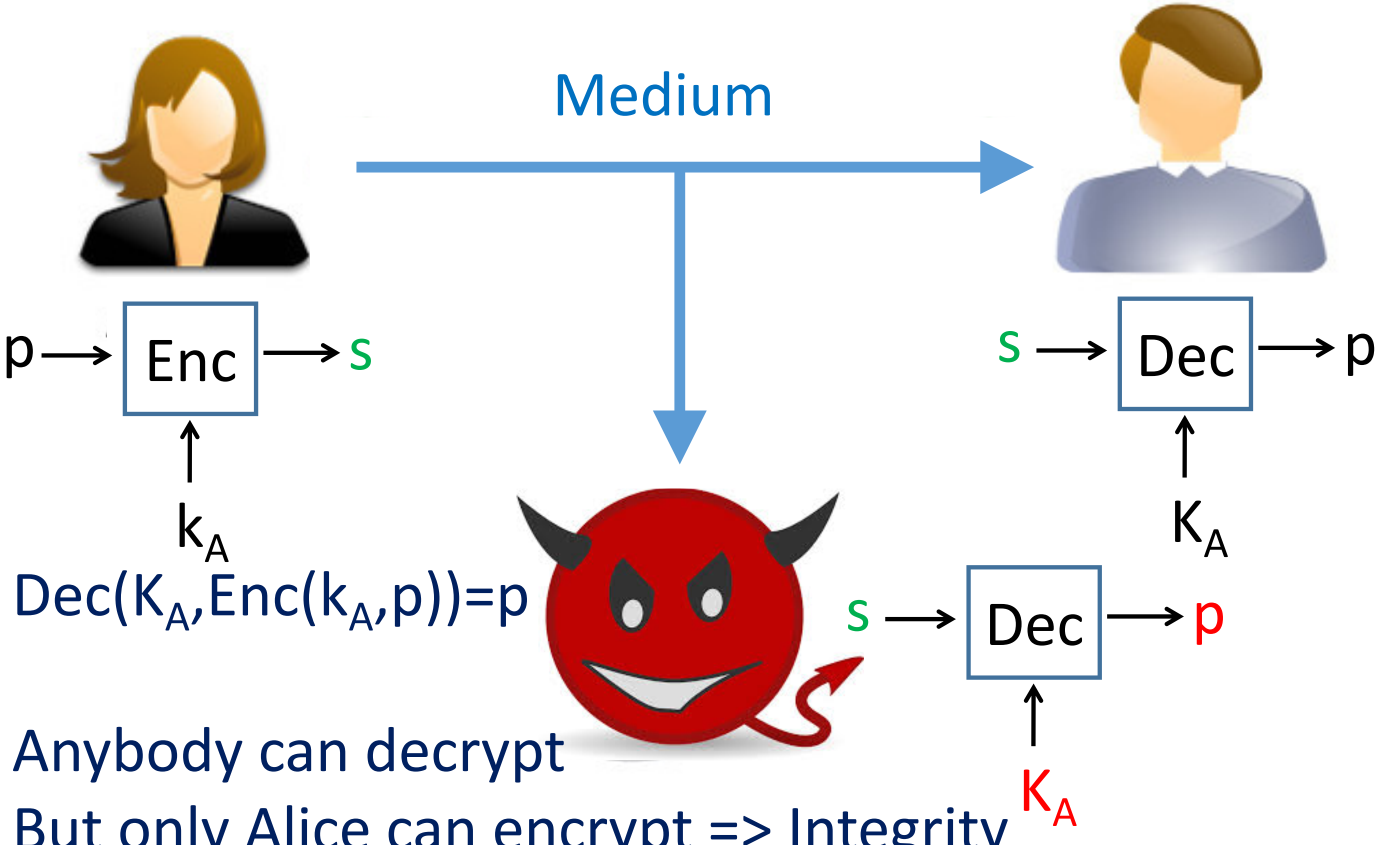

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Message Authentication Recap

Message authentication is to:

- Protect message integrity
- Sender authentication

Prevent threats, including:

- Masquerading/spoofing
- Content modification
- Sequence modification
- Timing modification

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Digital Signature

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- Receiver forges a received message
- Sender deny sending message

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Able to retain a copy in storage

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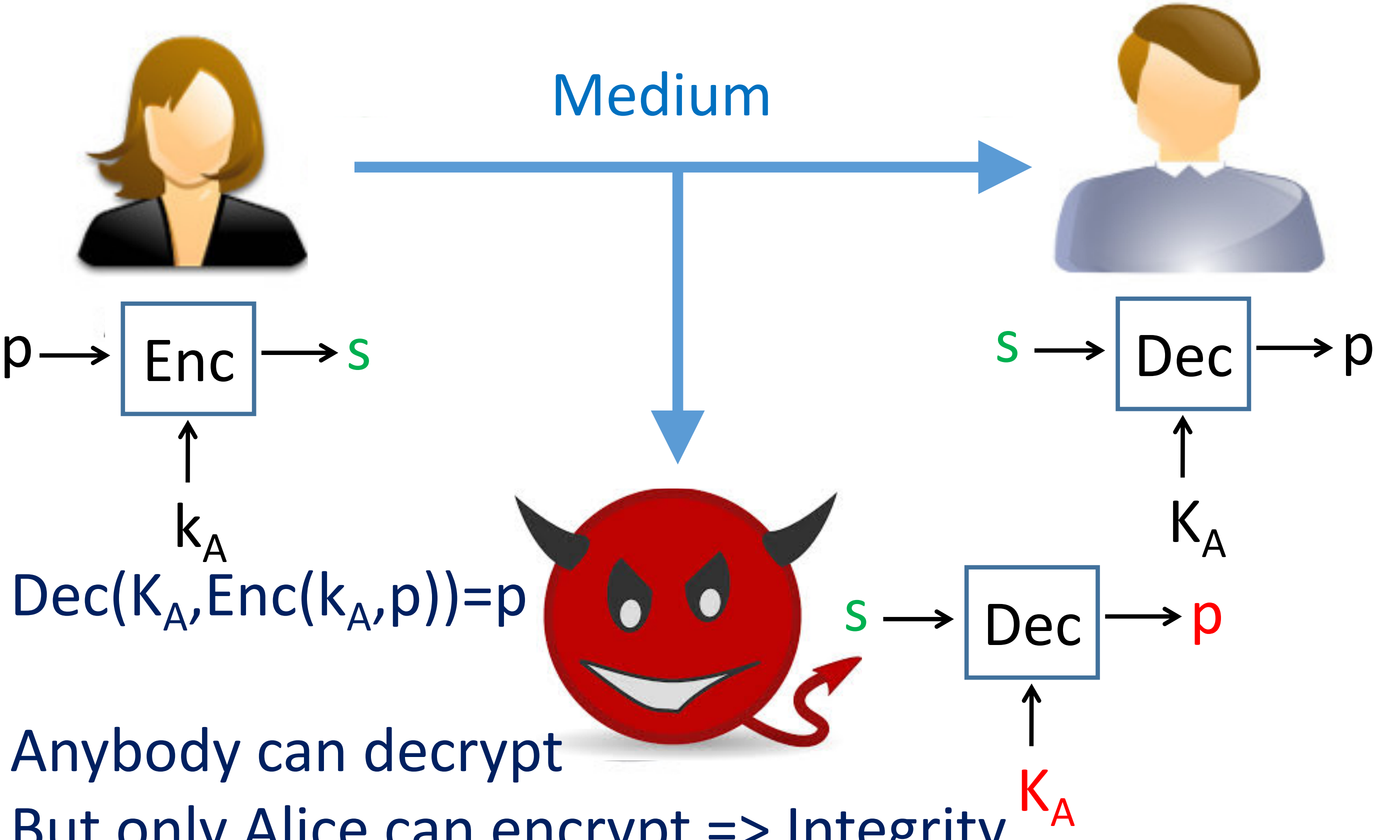

Medium

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$s \rightarrow$ Dec $\rightarrow p$

K_A

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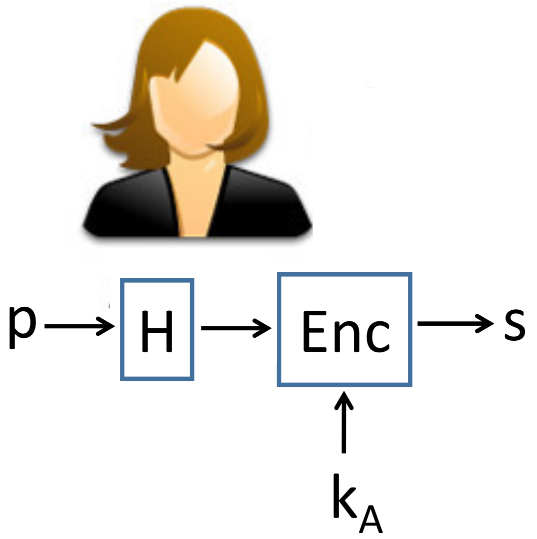
Digital Signature



p

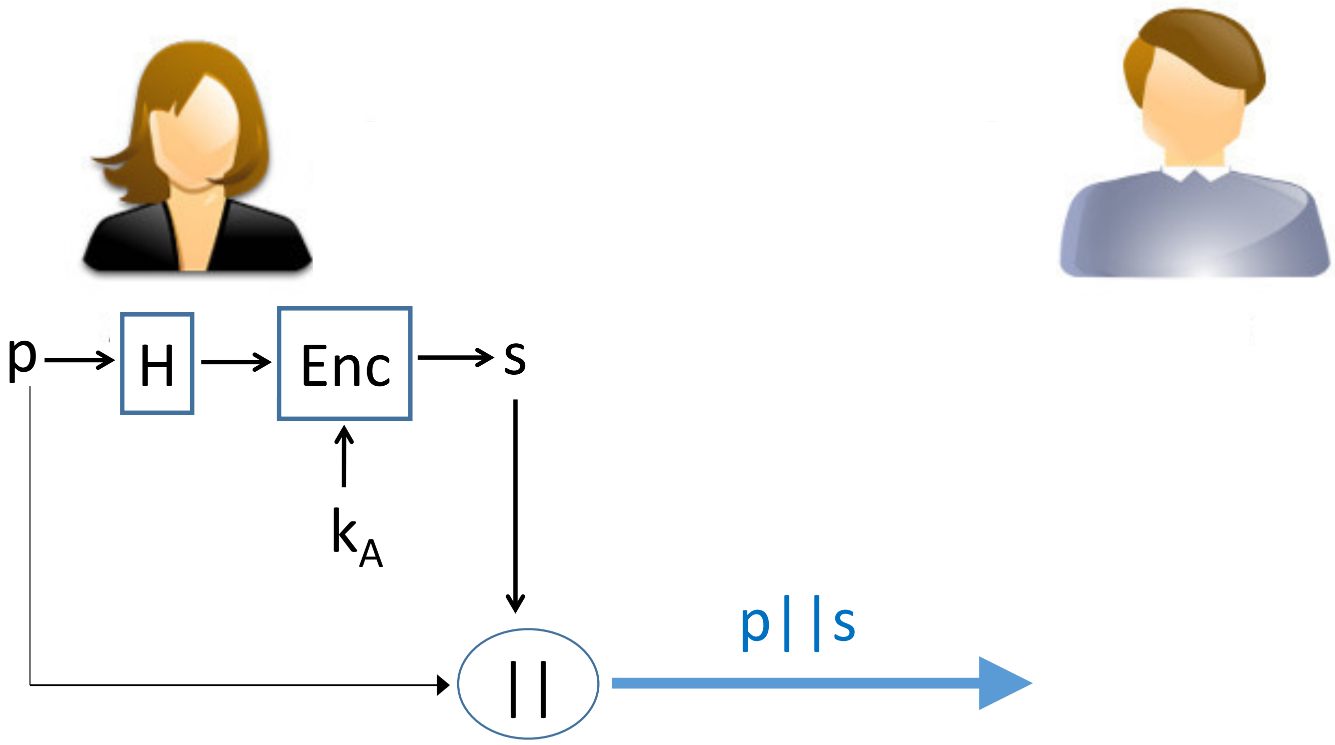
H

Enc

s

k_A

Digital Signature



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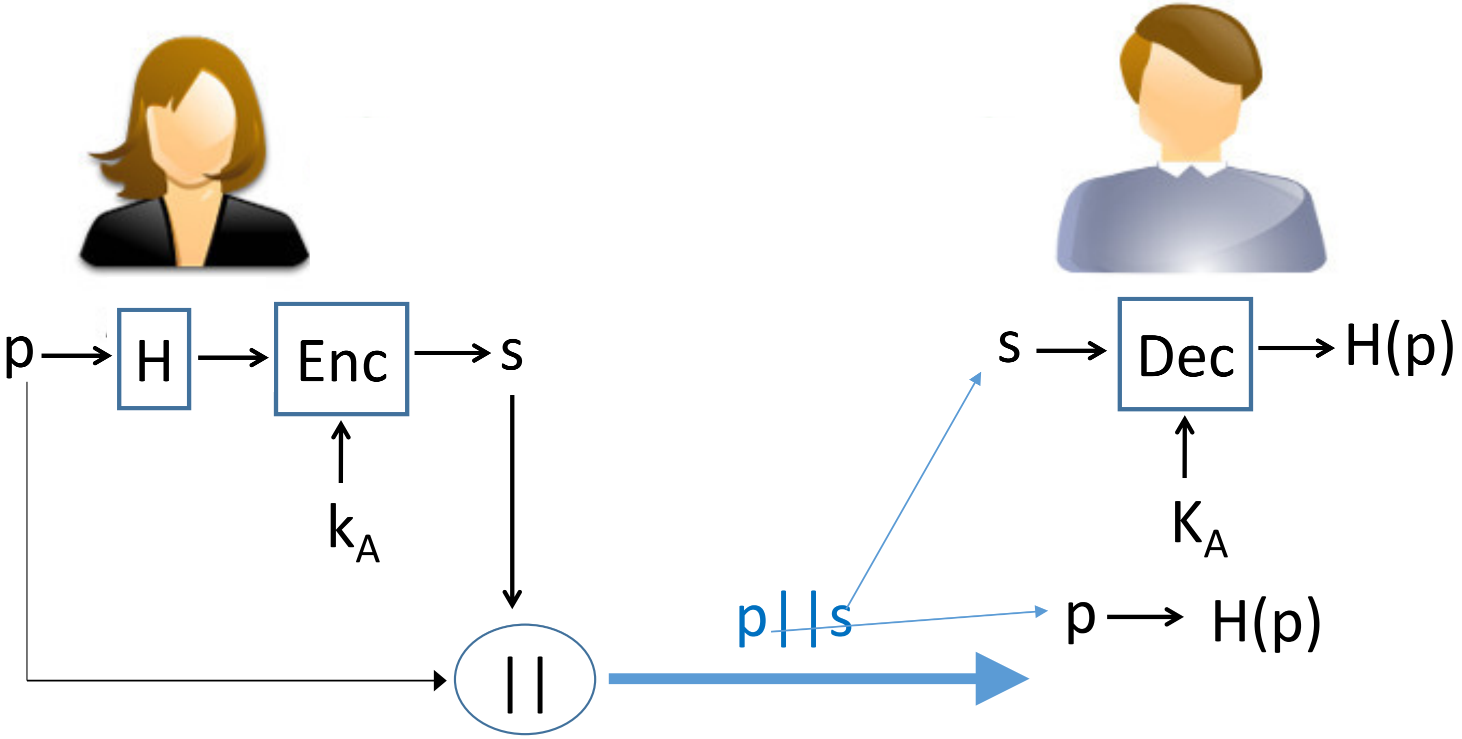

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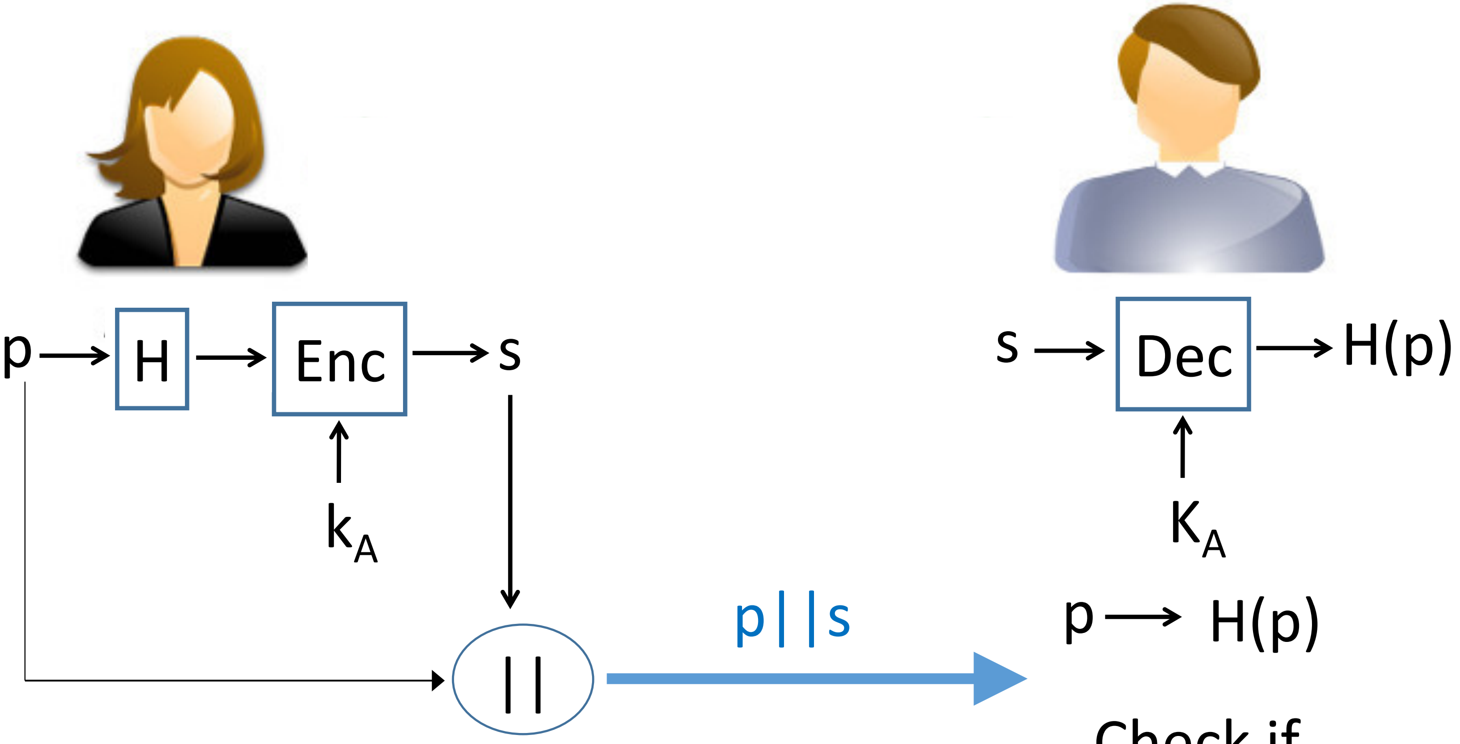

Check if match?