Key Management

Session Objectives

To understand:

- Symmetric key distribution using symmetric encryption
- Symmetric key distribution using public-key encryption

Session Outcomes

At the end of this session, participants will be able to

- Discuss the different ways of distributing symmetric and asymmetric keys

Agenda

1 Key Management and Distribution

Presentation Outline

1 Key Management and Distribution

Key Management and Distribution

- topics of cryptographic key management / key distribution are complex
- cryptographic, protocol, & management issues
- symmetric schemes require both parties to share a common secret key
- public key schemes require parties to acquire valid public keys
- have concerns with doing both

Key Distribution

- symmetric schemes require both parties to share a common secret key
- issue is how to securely distribute this key
- whilst protecting it from others
- frequent key changes can be desirable
- often secure system failure due to a break in the key distribution scheme

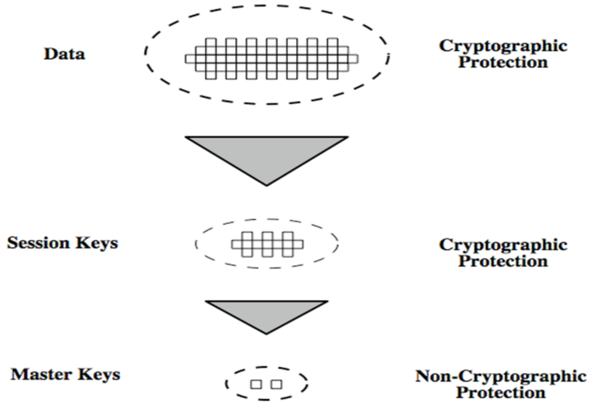
Key Distribution

- given parties A and B have various key distribution alternatives:
  1. A can select key and physically deliver to B
  2. third party can select & deliver key to A & B
  3. if A & B have communicated previously can use previous key to encrypt a new key
  4. if A & B have secure communications with a third party C, C can relay key between A & B

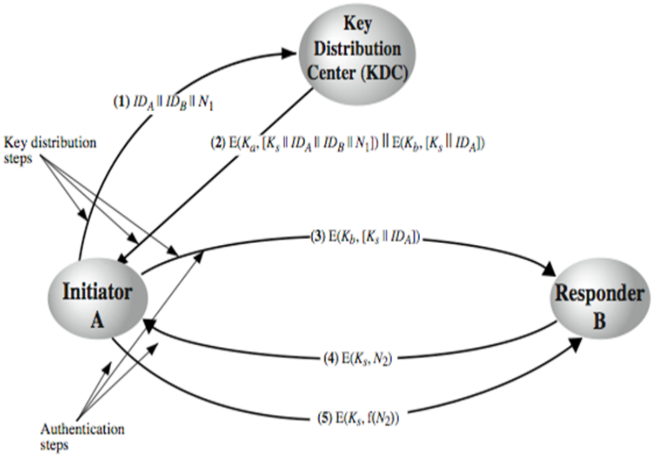
Key Hierarchy

- typically have a hierarchy of keys
- session key
  - temporary key
  - used for encryption of data between users
  - for one logical session then discarded
- master key
  - used to encrypt session keys
  - shared by user & key distribution center

Key Hierarchy



Key Distribution Scenario


Key Distribution Center (KDC)
(1) $ID_A \| ID_B \| N_1$
Key distribution steps
(2) $E(K_a, [K_s \| ID_A \| ID_B \| N_1]) \| E(K_b, [K_s \| ID_A])$
(3) $E(K_b, [K_s \| ID_A])$
Initiator A
Responder B
(4) $E(K_s, N_2)$
(5) $E(K_s, f(N_2))$
Authentication steps

Key Distribution Issues

- hierarchies of KDC's required for large networks, but must trust each other
- session key lifetimes should be limited for greater security
- use of automatic key distribution on behalf of users, but must trust system
- use of decentralized key distribution
- controlling key usage

Symmetric Key Distribution Using Public Keys

- public key cryptosystems are inefficient
  - so almost never use for direct data encryption rather use to encrypt secret keys for distribution