CERIAS

The Center for Education and Research in Information Assurance and Security

PURDUE UNIVERSITY

Private Anonymous Messaging

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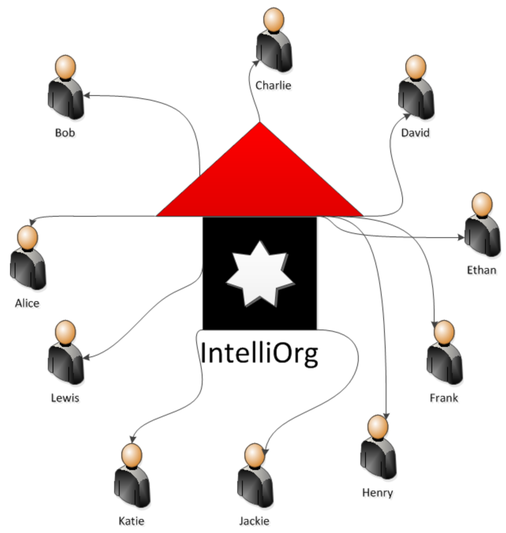
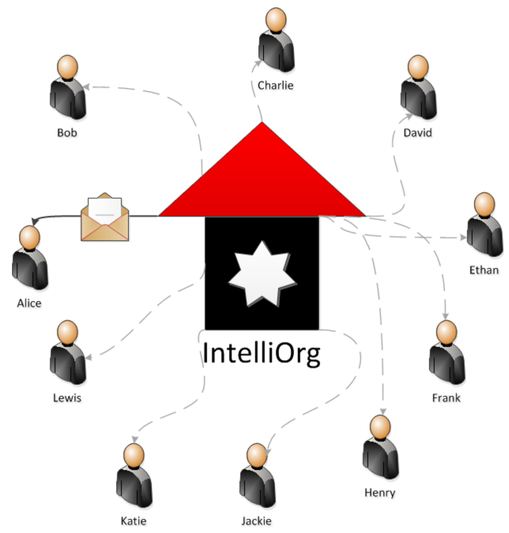
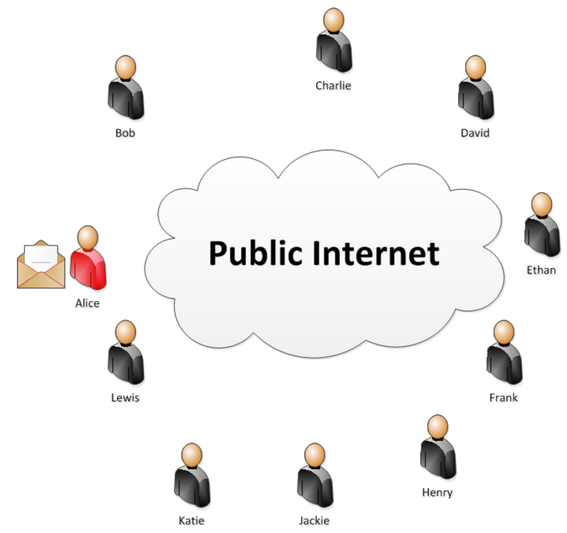


Secret Agents of intelliOrg



Message sent to the only available agent

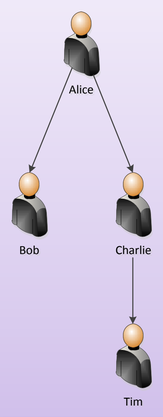


The organization is no longer accessible and other agents need the message

Requirements

- Dynamic set of agents
- Agents do not know each other
- Obtain messages from other agents
- Use public network
- Requester and provider anonymity

Hierarchical Identity Based Encryption



Key Generation by Alice

Setup → Params = P, Master Key = K

Alice, P, K → KeyGen → $K_{priv(Alice)}$

Bob, P, $K_{priv(Alice)}$ → KeyGen → $K_{priv(Bob)}$

Charlie, P, $K_{priv(Alice)}$ → KeyGen → $K_{priv(Charlie)}$

Key Generation by Charlie

Tim, P, $K_{priv(Charlie)}$ → KeyGen → $K_{priv(Tim)}$

Sending 'Msg' to Tim

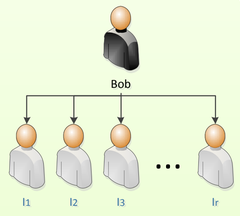
Msg, P, Alice, Charlie, Tim → Encrypt → Cipher Text

Cipher Text, $K_{priv(Tim)}$ → Decrypt → Msg

Proposed Scheme


Bob

- Select a random = $\boldsymbol{I_r}$
- $ID_r = {h_1}^{I_1} \cdot {h_2}^{I_2} \cdot {h_3}^{I_r}$
- $\boldsymbol{ID_r}$ is the request for data




Alice

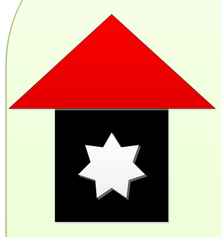
Msg, P, $\boldsymbol{ID_r}$ → Encrypt' → Cipher Text


Bob

I_r, P, $K_{priv(Bob)}$ → KeyGen → $K_{priv(r)}$

Cipher Text, $K_{priv(r)}$ → Decrypt → Msg

Group Membership Changes



$Master\ key = K$

$Kpriv(Agent) = ({g_2}^{K} \cdot (A^r), B^r, C^r)$

Generate a fresh master key = $\boldsymbol{K'}$

Regenerate $Kpriv(Agent_i)$ of all agents

Publish →

Blinded ID	Key Component
...	...
$(Agent_i)^{r'}$	${g_2}^{K'} \cdot (A^r)$
...	...

& r'


Alice

Use r' to create key to look up and locate ${g_2}^{K'} \cdot (A^r)$ component and update private key!

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