Privacy-Enhanced Social Routing

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Opportunistic Networks

Can use the mobile devices that people already carry around, forming an **opportunistic network**

**Routing?**

- Epidemic routing – high cost flooding
- **Social routing** – lower cost, but requires known network
Privacy

How can we protect people's social network privacy?

If we get it wrong...

- Social networks exposed
- Linkability to other sites – including pseudonymous websites

http://news.bbc.co.uk/1/hi/magazine/8136395.stm
Social Network Obfuscation

Our approaches

- **Add nodes** to the social network
- **Remove nodes** from the social network
- **Probabilistic querying** of whether encountered node is in the social network
  - Bloom filters? Challenge-response?
Obfuscation Example

Source

Destination
Obfuscation Example

Diagram showing a network with nodes labeled as 'Source' and 'Destination', with paths connecting them.
Routing Performance after Social Network Obfuscation

Trace driven simulation using ns-2

Each simulation

- 5 repeats (so far)
- 30 days simulated
- 30 messages/day, total: 900 messages
- TTL of messages: 1 day
- 25 nodes
Preliminary Results

![Graph showing delivery delay versus node change percentage]
Preliminary Results

![Graph](image-url)

- **Y-axis**: Delivery Cost (\#Sent / \#Unique)
- **X-axis**: Node Change %

The graph illustrates the relationship between delivery cost and node change percentage, showing a increasing trend as the node change percentage increases.
Preliminary Results

![Graph showing delivery ratio vs. node change percentage. The graph indicates a positive correlation, with delivery ratio increasing as node change percentage increases.](image-url)
What next?

Refining current approach

- More simulations
- Other data sets (reality mining, ...)

The big picture

- Is social network privacy really a big deal?
- What threats are people worried about? How worried? Willing to make performance trade-off?
- To find out: user studies!
- Studies to be part of the PVNets project <http://www.pvnets.org/>
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