Survey on Reputation and Incentive Schemes in Wireless Ad-Hoc Networks
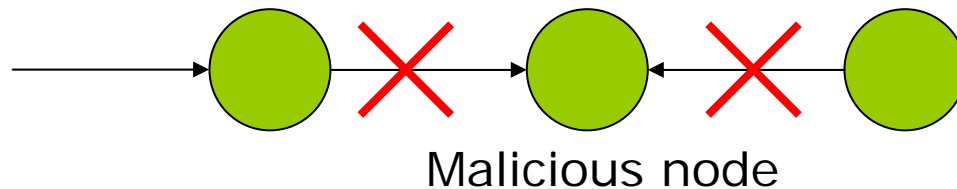
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Introduction

- Mobile ad-hoc networks are formed by a set of mobile nodes in a self-organized way without relying on any infrastructure or centralized administration.

- The nodes in the networks have to cooperate with each other to provide networking services.

Non-cooperative nodes

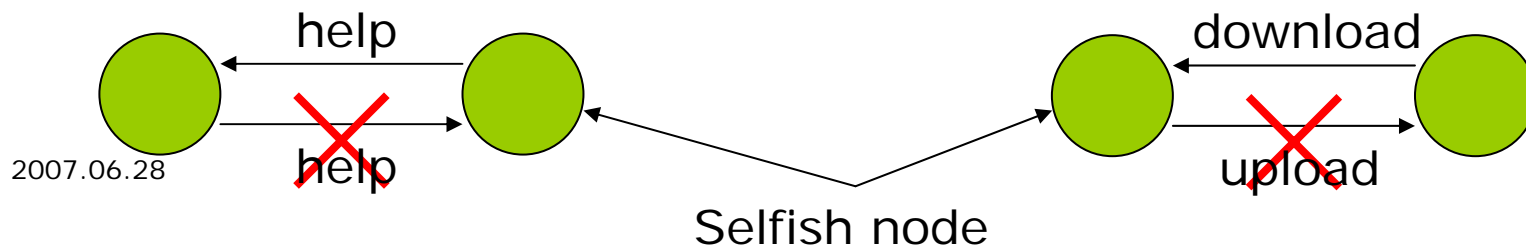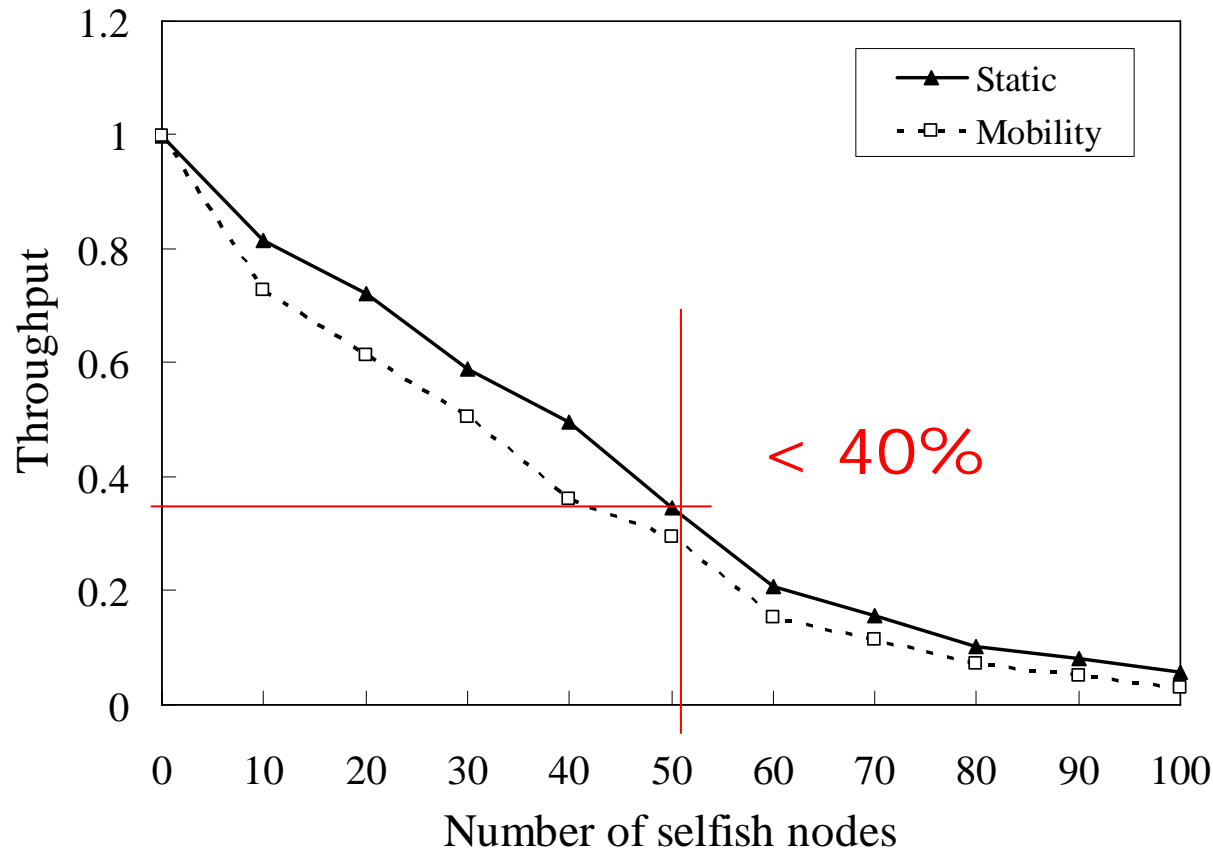## ▫ Malicious nodes

- To damage the network

Malicious node

▫ Selfish nodes

- To maximize their benefits

help

help

download

upload

Selfish node

The effect of selfish nodes on network throughput

The network has 100 nodes

Solutions

- ## Reputation scheme
  - Giving each node a reputation value
  - Punishing the nodes with bad reputation values
- ## Incentive scheme
  - In order to stimulate nodes to provide network services.
  - Nodes will be rewarded for providing services.

Reputation scheme

- ## Watchdog-like scheme [1][5]
  - A watchdog monitors all nodes' behaviors in the network.

- ## CONFIDNAT [2][3]
  - The trust relationships with others rely on passive observation of all packets within a one hop neighborhood.

- ## CORE (COllaborative REputation Mechanism) [4]
  - Each node keeps track of other nodes' reputation computed based on information monitored and provided by other nodes.

Drawbacks

- The watchdog-like scheme can not properly monitor the neighbor nodes.

- These approaches may incur traffic overhead and wrong accusation spreading

- They do not actively provide incentives for the selfish nodes to stimulate cooperation in the network.

Incentive Schemes

- ## MarketNet [6], 1998
  - This economic model uses virtual currency to control access to system resources.

- ## Sprite [7]
  - It uses credit to provide incentive to mobile nodes for stimulating cooperation.
  - It uses the Credit Clearance Service (CCS) to manage credits and accounts for each node as a bank.

Incentive Schemes

Nuglet [8][9][10]

- It uses virtual currency as payment for packet forwarding services.

- Packet Purse Model
  - The currency is loaded in the packet by source node.
  - And the currency will be taken out by intermediate nodes during forwarding packet.

- Packet Trade Model
  - The intermediate node buys the packet from the previous node and sell it to the next hop node.

Drawbacks

- ◻ These incentive mechanisms have not considered the issue of cooperating probability of each node in the network.

- ◻ They do not mention the mechanisms for preventing the malicious behaviors of nodes in the network.

- ◻ Some schemes need a central server to manage the network, which is not applicable in wireless ad-hoc networks.

Summary

- The centralized management is not suitable for wireless ad hoc networks.
- Second-hand information may cause wrong decision.
- Cooperating probability should be considered.
- The reputation scheme is passive.
- The incentive scheme can not resist malicious nodes.

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