Maintaining Community Based Infrastructures

Jon Crowcroft

http://www.cl.cam.ac.uk/~jac22

Ad Hoc and P2P et al.

- User is a provider and subscriber
- Infrastructure is not quite a "commons"
- Incentives to cheat aligned with lack of resource (e.g. dial up v. broadband p2p user, or low battery life ad hoc user more likely to freeride)
- Other problems such as:

Security Problems

- Accidental filesharing (recent studies!)
- Accidental capacity sharing (warchalking)
- Loss of identity
- Denial of service
- Stem from lack of "community police" or community "bank" - need to re-create these but maintain decentralisation… … ...

Decentralized Trust/Money

- Need mechanism that scales with population
- Needs to be decentralized
- Doesn't need to be perfect
- prior work: Recommendation nets, anonymous e-cash, voting and witnesses.
- Needs to have stability properties...

Need mechanism that scales with population

Needs to be decentralized

Doesn't need to be perfect

prior work: Recommendation nets, anonymous e-cash, voting and witnesses.

Needs to have stability properties...

Decentralized Control

- Propose System of tokens (not quite money)
- Offer service, earn tokens
- Use service, spend tokens
- Never quite zero tokens
- In idle state, tokens accrue slowly up to a constant, and decay slowly to that constant to prevent starvation or hoarding

Like congestion pricing?

- Yes, control law for gaining and spending tokens is same as ECN pricing….

- So proportional fairness - is this right policy?

- No: but we can add another policy on top of this once we have 1

- Why don't I just build another non-coop P2P system?

Social Evolution & Competition

- Freeloaders in our system are not ostracized

- People who ostracize themselves will find it hard to attract peers

- I.e. we use metcalfe's "law" to say value of coop-net is going to be much higher than non-coop net, so users far more likely to join it than other -

- Steady state equilibirium has small set of joiners and leavers and large set of true

Research Problems

- Protecting tokens from misuse (forged tokens, etc)

- Designing overlay policies and systems to regulate them

- More than 2 parameters (power/capacity or storage/bandwidth, or tx/rx)?

- Etc etc Discuss :-)