

The Resource Management Problem

- Goal: maximize a peer's *utility* to the overall system while minimizing its potential *threat*.
- Threat: peers eat resources

Managing scarce resources...

- Freenet: unpopular data is dropped; popular data is cached near the requester
- Gnutella: data is stored only on the publisher's own computer
- Publius: currently limits submissions to 100K

Introducing accountability...

May 2, 2001

Accountability and Resource Mana

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P2P models

1. Static, identified operators

- Examples: Mixmaster remailer, Publius
- Limited users: legal mechanisms possible
- Reputation and payment schemes

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Goal of payment schemes

- Manage scarcity of resources
 - Charge for access
- Prevent intentional attacks
- Restrict freeloading
- Result: optimize for “social efficiency”
 - Users contribute to overall system robustness

Payment schemes: models

- Proofs-of-Work (POWs)
 - examples: hash cash, Client Puzzles
- Fungible non-anonymous payments
 - Credit cards”
 - examples: MicroMint, PayWord, Millicent, Mondex
- Fungible anonymous payments
 - Cash”
 - examples: Chaum’s eCash, Brands’ digital cash

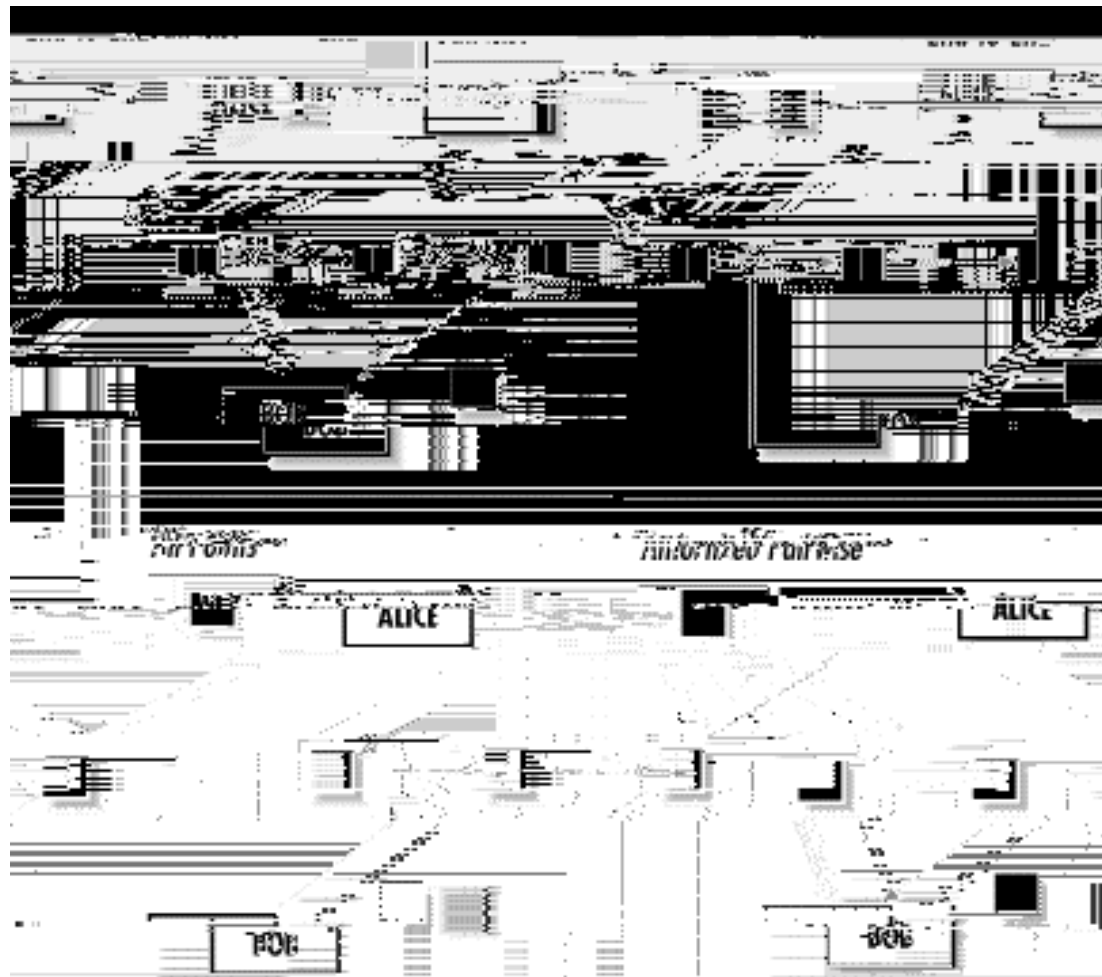
Payment schemes: distributed use

- How to stop double spending?
- Centralization: central “bank” servers
 - Fungible payments

Congestion management

- Renewable resource allocation
 - Determine need dynamically
 - Areas: bandwidth, computation, caching
 - *Solution? Only charge when congested*
- Cumulative resource allocation
 - Once allocated, not easily recoverable

Payment models



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Accountability and Resource Management

Reputation systems

- Track performance to predict future behavior
- Risk resources based on anticipated benefit (resource management approach)

Reputation systems



- Information provided by third parties

Example reputation systems

- PGP Web of Trust
 - Do a 26 day 20g actually map key to person
 - p i.3al 10 Wae enough
 - C i.ertification to do what?
- Advogato
 - U i.sa2 maximum flow to 3calculate reputation
 - Three levels of certification: apprentice, journeyman, master
 - R i.esists pseudospoofing via trust bottlenecks

Example reputation systems

Example reputation systems

- Mix-net reputations
 - Scorers track delivery failures, publish reputations
 - Need to tune parameters, e.g., how long nodes remember ratings
 - Higher reputation draws more traffic
- Free Haven
 - Need to notice servers that drop data early
 - Need mechanism to “punish” misbehaving servers
 - Nodes periodically broadcast reputation referrals
 - Credibility different from reputation

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Conclusion

- Peer-to-peer won't save you
- Accountability is not pixie dust
- Payment and reputation systems are

