

resource discovery in urban environments

Pol Ypodimatopoulos (ypod@mit.edu)
Viral Spaces

problem

- CPU power is abundant (cloud, fast phones)
- Connectivity is ubiquitous (3G, wifi)
- Apps on phones are comprehensive
- Why can't I find other Greek-speakers on the street yet, even if we wanted to?
- Why can't X find Y on Z yet, even if they wanted to?

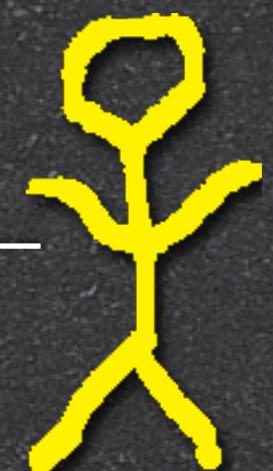
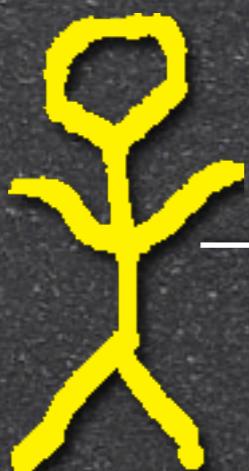
(scalability, fragmentation)

more requirements

- **simplicity** (discover any type of resource, humans or objects)
- **scalability** (support for internet-of-things?)
- **mobility** (cars discover each other while driving in opp. directions?)
- **real-time** (just-in-time information)
- **open protocol** (no silos)
- **anonymity** (when desirable)

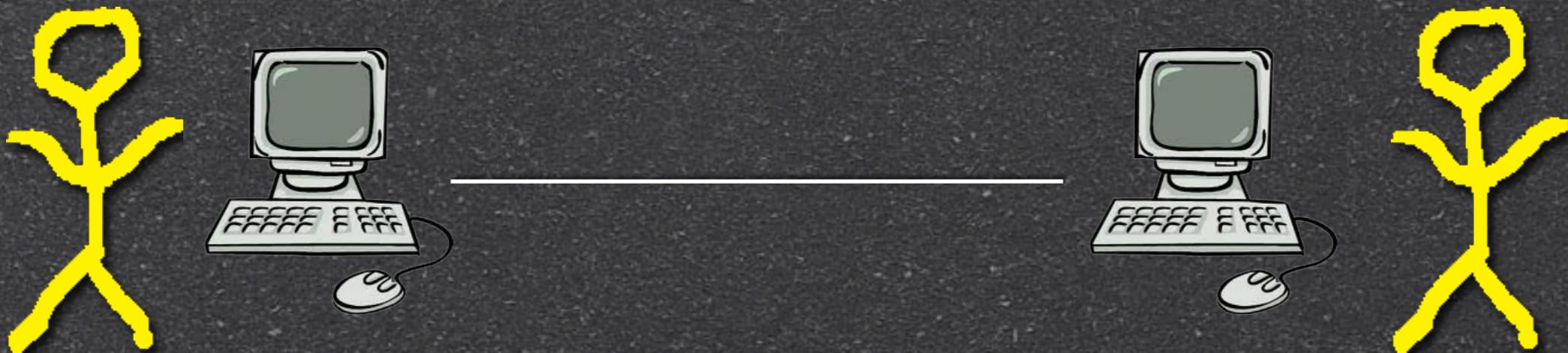
discovery mode 1

direct
(hey you!)



discovery mode 2

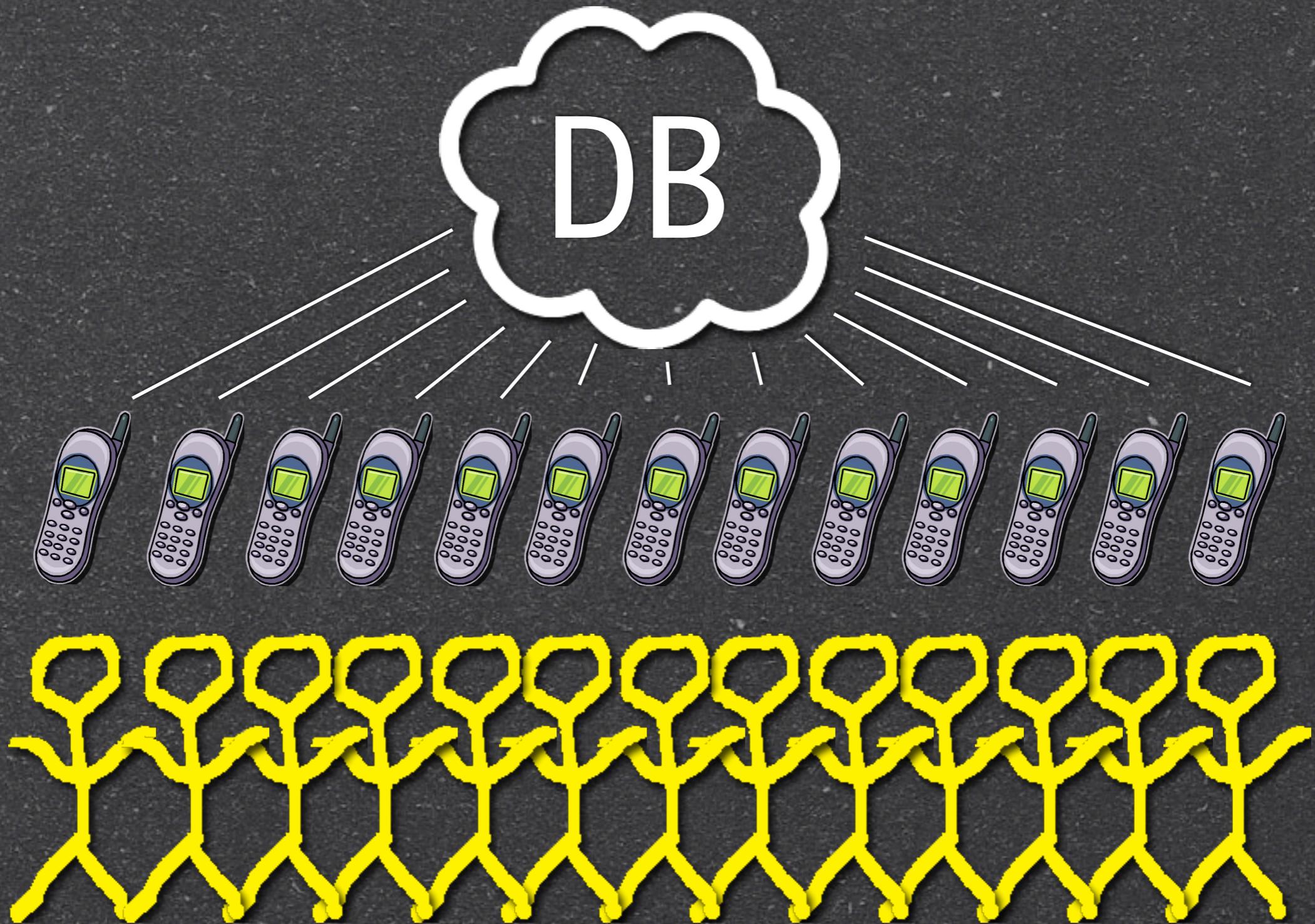
computer
(ebay, craigslist)



discovery mode 3

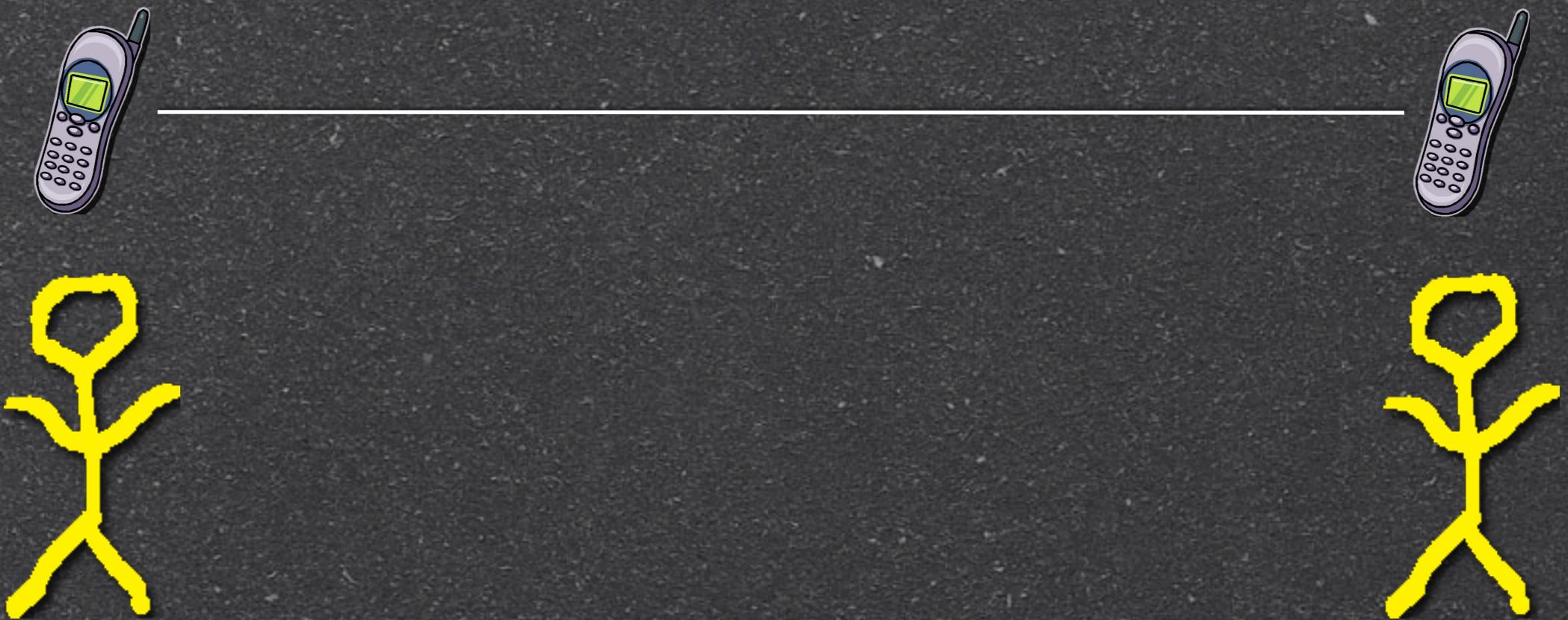


discovery mode 3

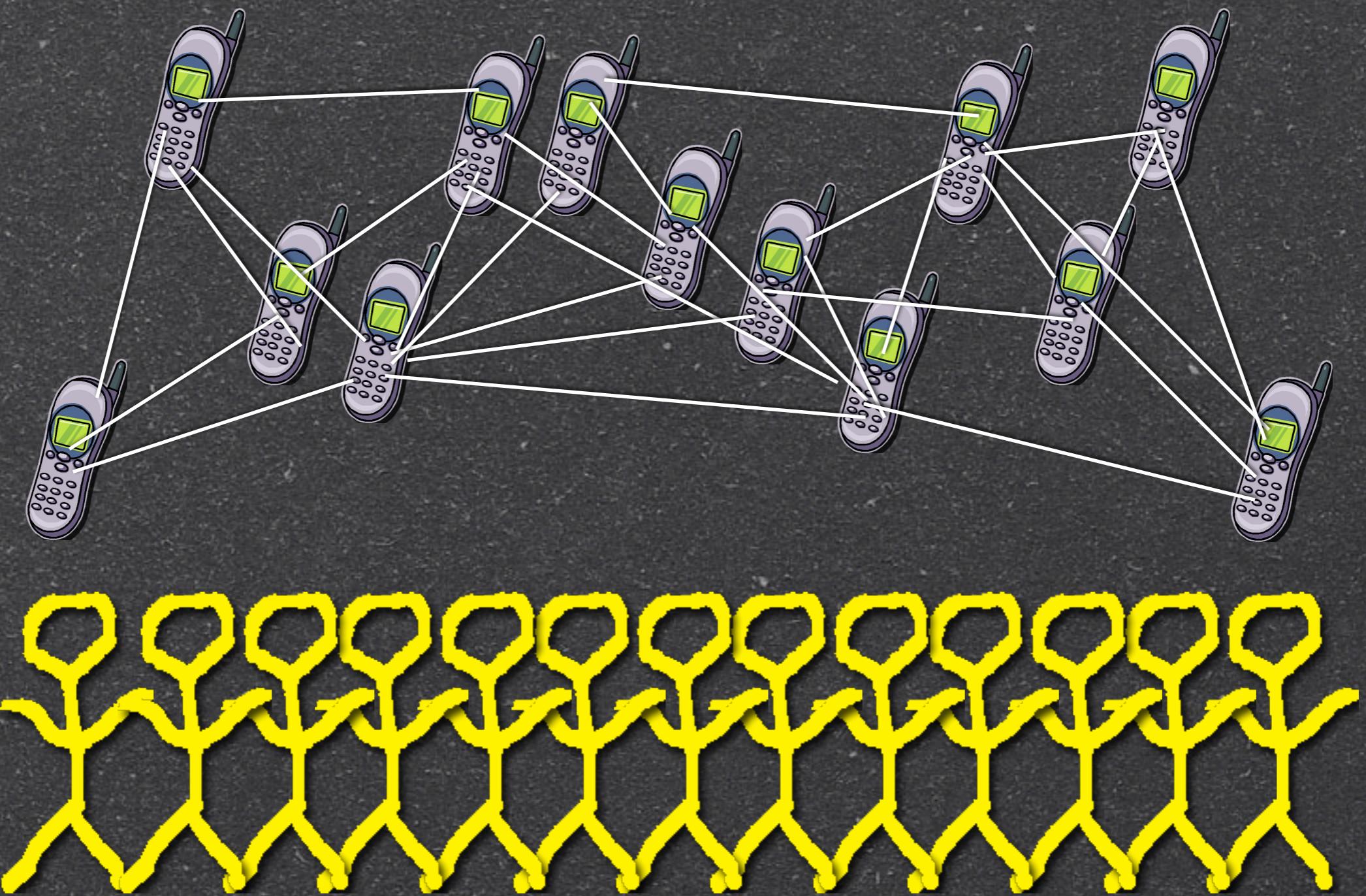


discovery mode 4

mobile-radio
bonjour, cerebro, etc



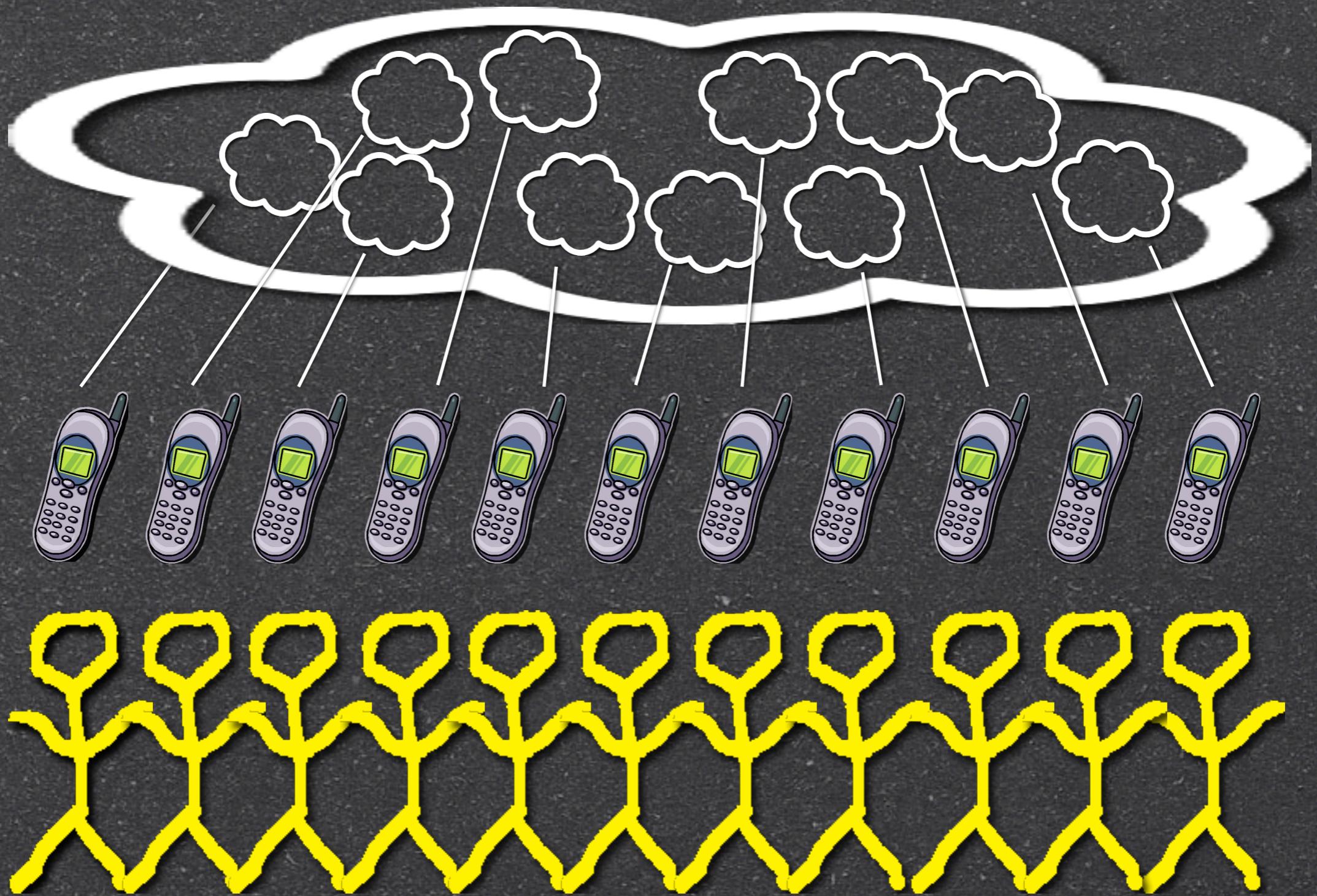
discovery mode 4



discovery mode 5



discovery mode 5



example

- What if we knew where people are heading?
 - more effective car-pooling
 - predict traffic congestion
- Implicit inference of destination
 - predict traffic congestion
 - infer destination as you turn around the corner

overview

| | open | real-time | scalability | applications run on | feasibility | problems |
|--|------|-----------|-------------|---------------------|--------------|------------------------------|
| h-server-h (h=human) | ✗ | ✗ | ✓ | computer | ✓ | openness privacy |
| h-d-cloud-d-h (d=device c=cloud) | ✗ | ✓ | ? | device | ✓ | openness privacy |
| h-d-radio-d-h | ✓ | ✓ | ✗ | device | ? | power cons. fragmentation |
| h-d-a-c-a-d-h (a=agent) | ✓ | ✓ | ✓ | cloud | Pol's thesis | discovery in the cloud? |

h-m-a-cloud-a-m-h

human

mobile

agent

agent

mobile

human

agent
(proxy for mobile device)



agent
(proxy for mobile device)



agent capabilities:

- profile
- location
- barter
- expertise
- <your_app_here>



agent properties:

- easily spawned
- can migrate between hosting services
- anonymous (profile is optional)

progress

- agents: Ego project ✓
- discovery:
 - Google ✓
 - space quantization (pubsubhubbub)
 - flocking algorithm
- Case study: Glass Infrastructure

questions?

ypod@mit.edu