

# DataSpotting: Offloading Cellular Traffic via Managed Device-to-Device Data Transfer at Data Spots

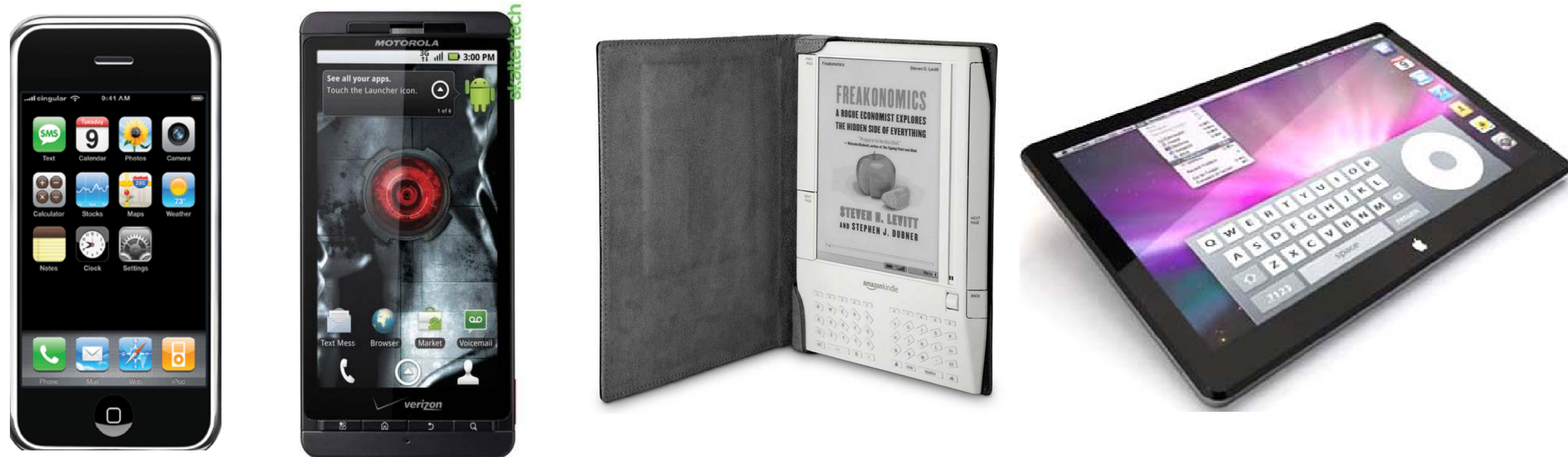
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## 1. Motivation

- Data demand is overloading cellular networks
  - Video traffic causing heavy overload ... expected to increase in future
  - Pricing scheme binds prices with data usage
  - The trend will continue with



- Operators resort to expensive solutions
  - Update infrastructure with additional hardware
  - Spectrum provisioning

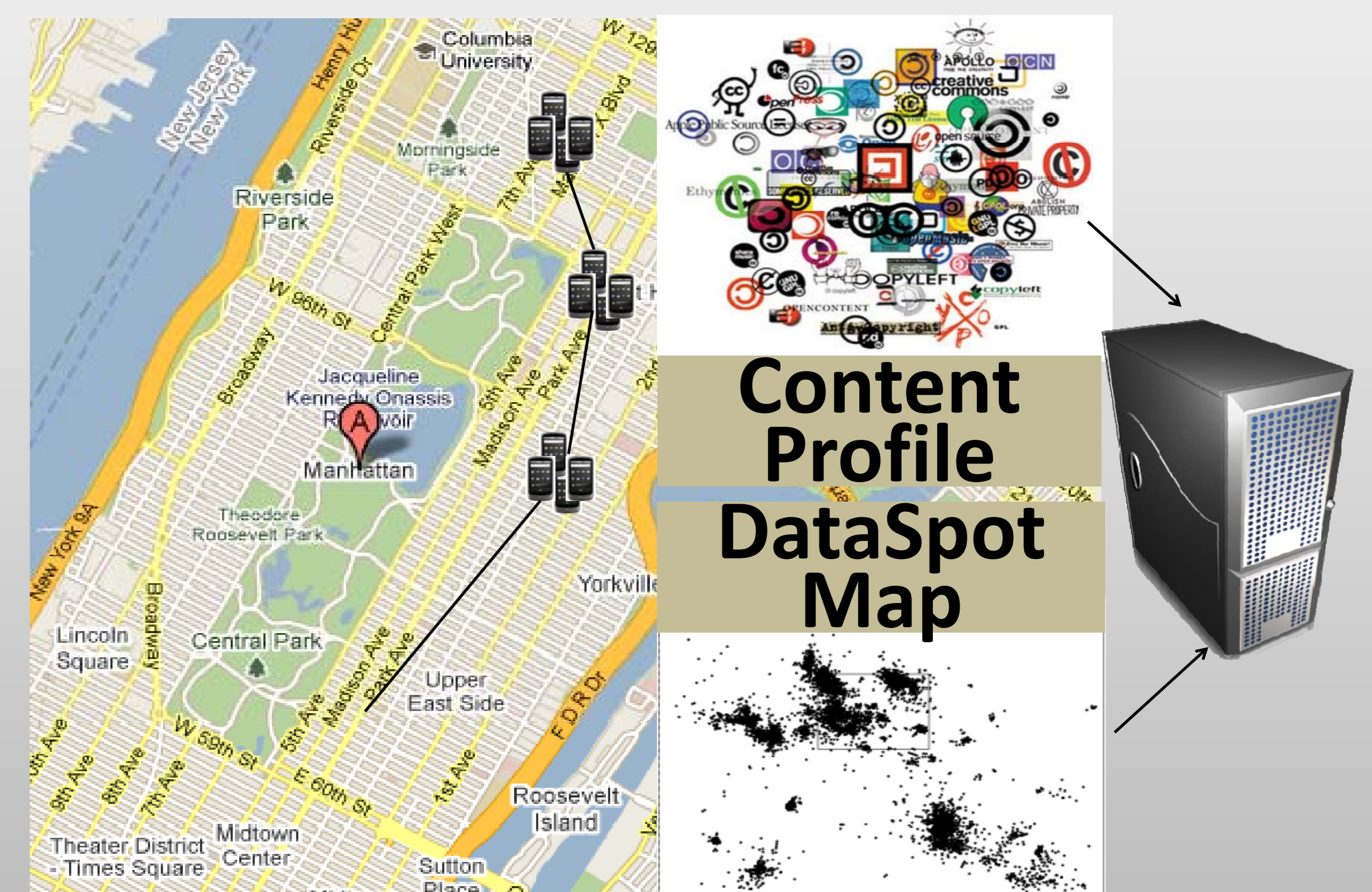
## 2. Offloading Opportunity

- Use mobile devices as caches
  - Storage becoming cheaper and smaller (32G, 64G, ...)
- High density of users
- Facilitates P2P connections (mediated by cellular operators)
  - Mitigate security, privacy, and incentive concern
- This enables "DataSpots" - areas with clusters of mobile users
  - Users are usually clustered during peak hours



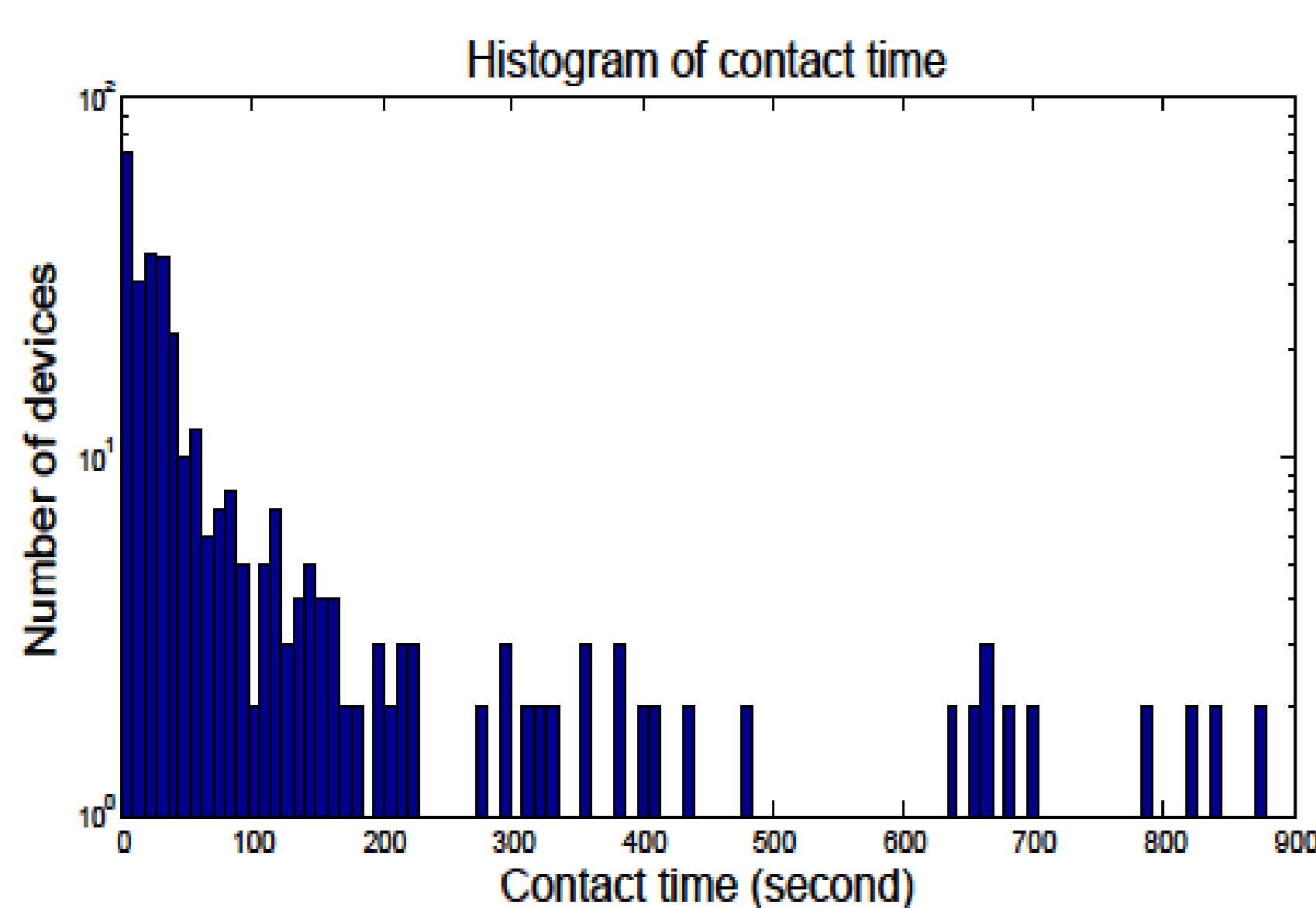
## 3. DataSpotting System Overview

- Localization:** Report user position periodically
- Building DataSpot map and content profile:**  
The server builds data spot maps and keeps track of content available in each data spot
- Matchmaking users to connect to neighbors inside DataSpots:**  
Users retrieve content via ad-hoc connection



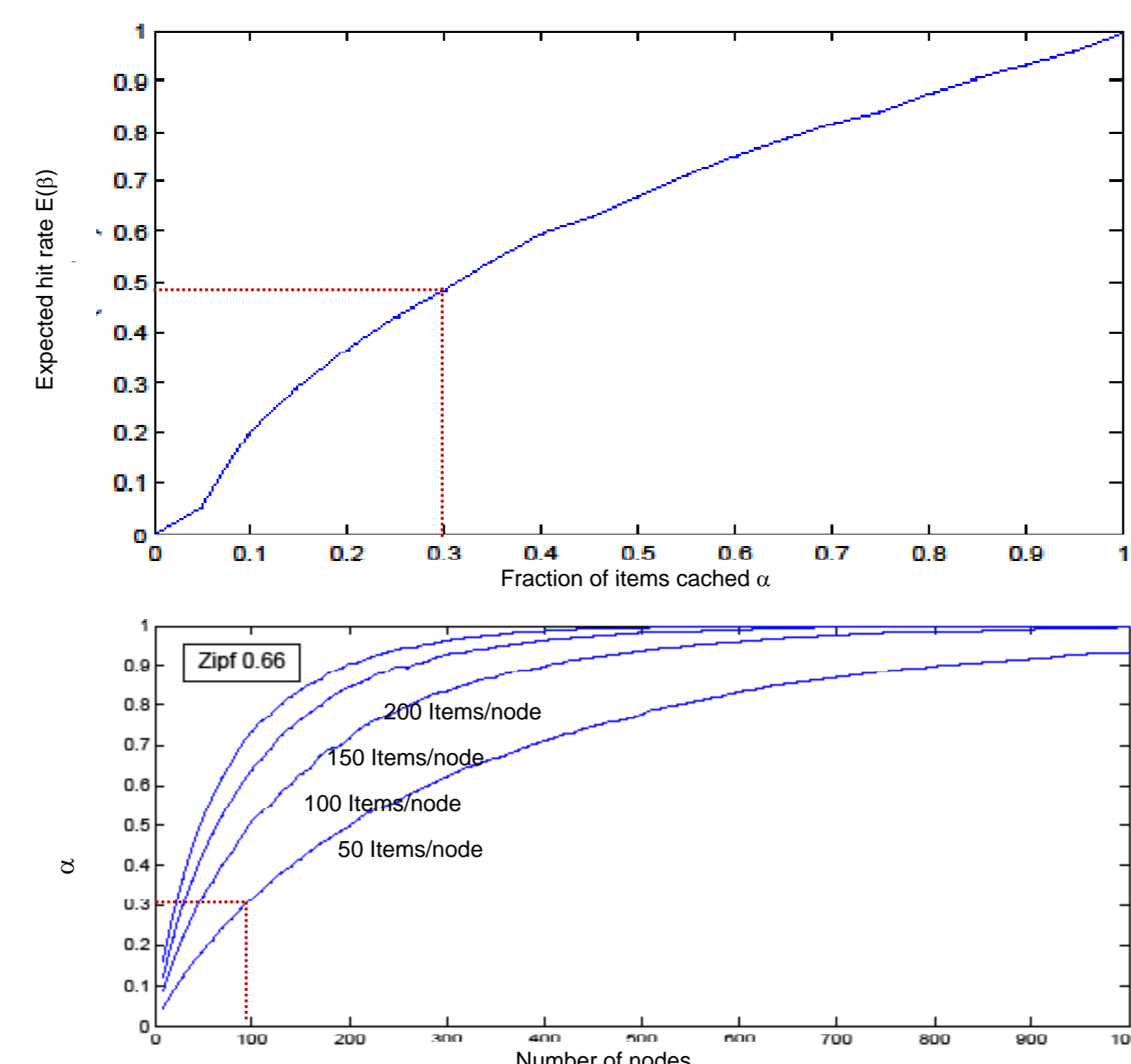
## 4. Measurement

- Wardriving Manhattan



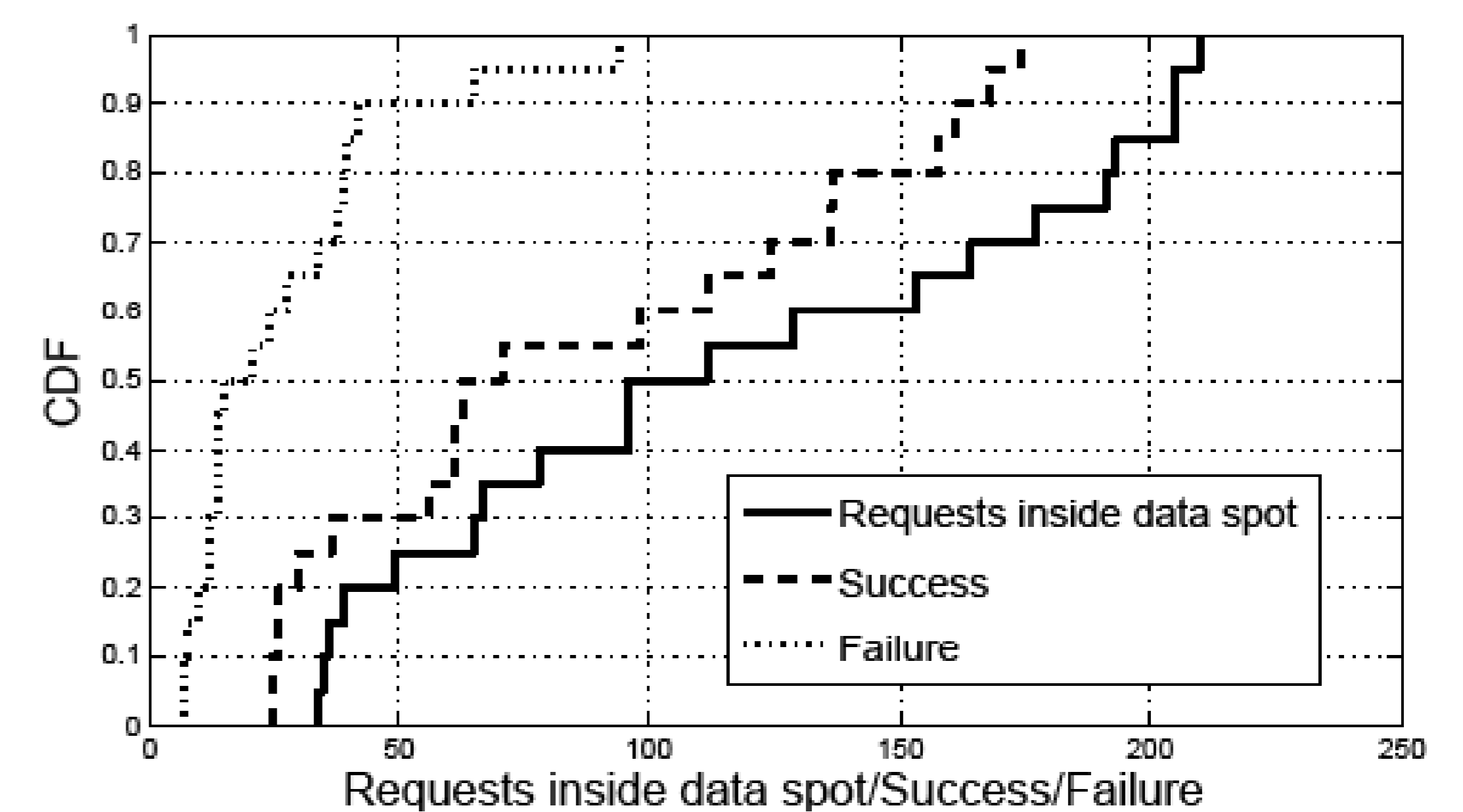
- User density: 2912/km<sup>2</sup>
- Contact time (Penn Station)

- Hit rate inside a DataSpot



## 5. Simulation Results

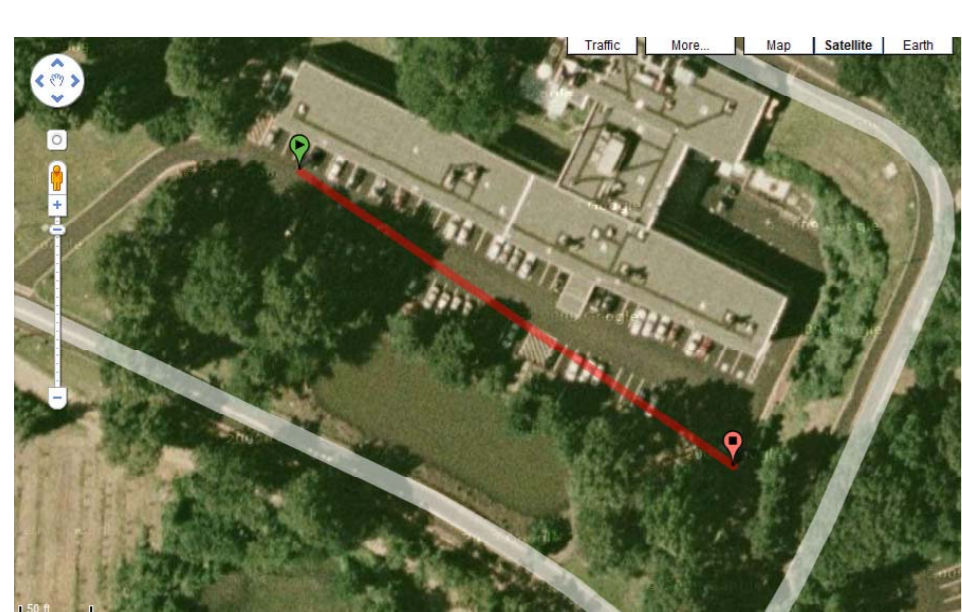
- Simulation with mobility model and measurement data
  - Mean hit rate: 0.3644



## 6. Implementation

- Implementation on Android

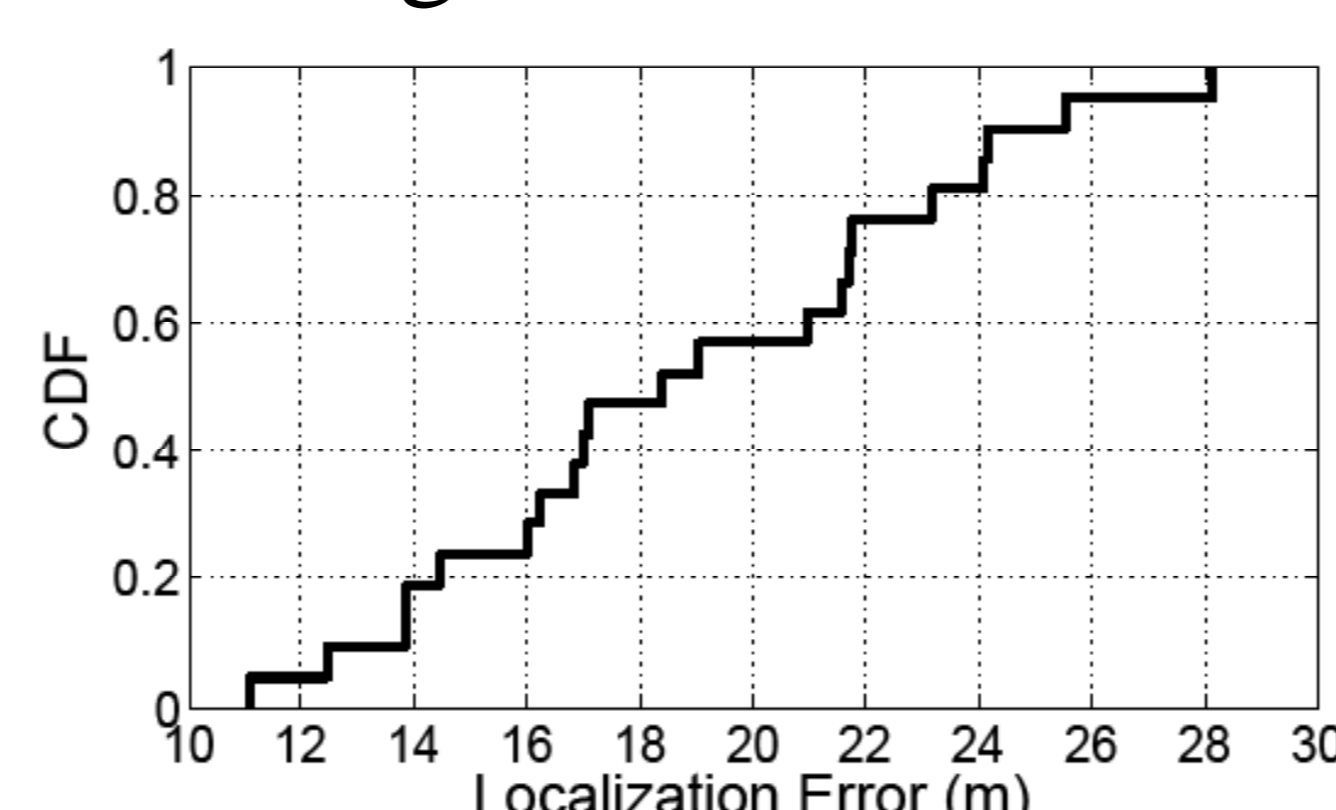
- Range: 110 - 115m



- Data rate: 1-1.5MBps

- Localization error during GPS sampling interval

- Localization using GPS, accelerometer and compass



## 7. Ongoing Work

- Real life deployment
- Incentive mechanism
- Privacy concern
- Content evolution modeling