Privacy Implications of Mobile Cloud Computing
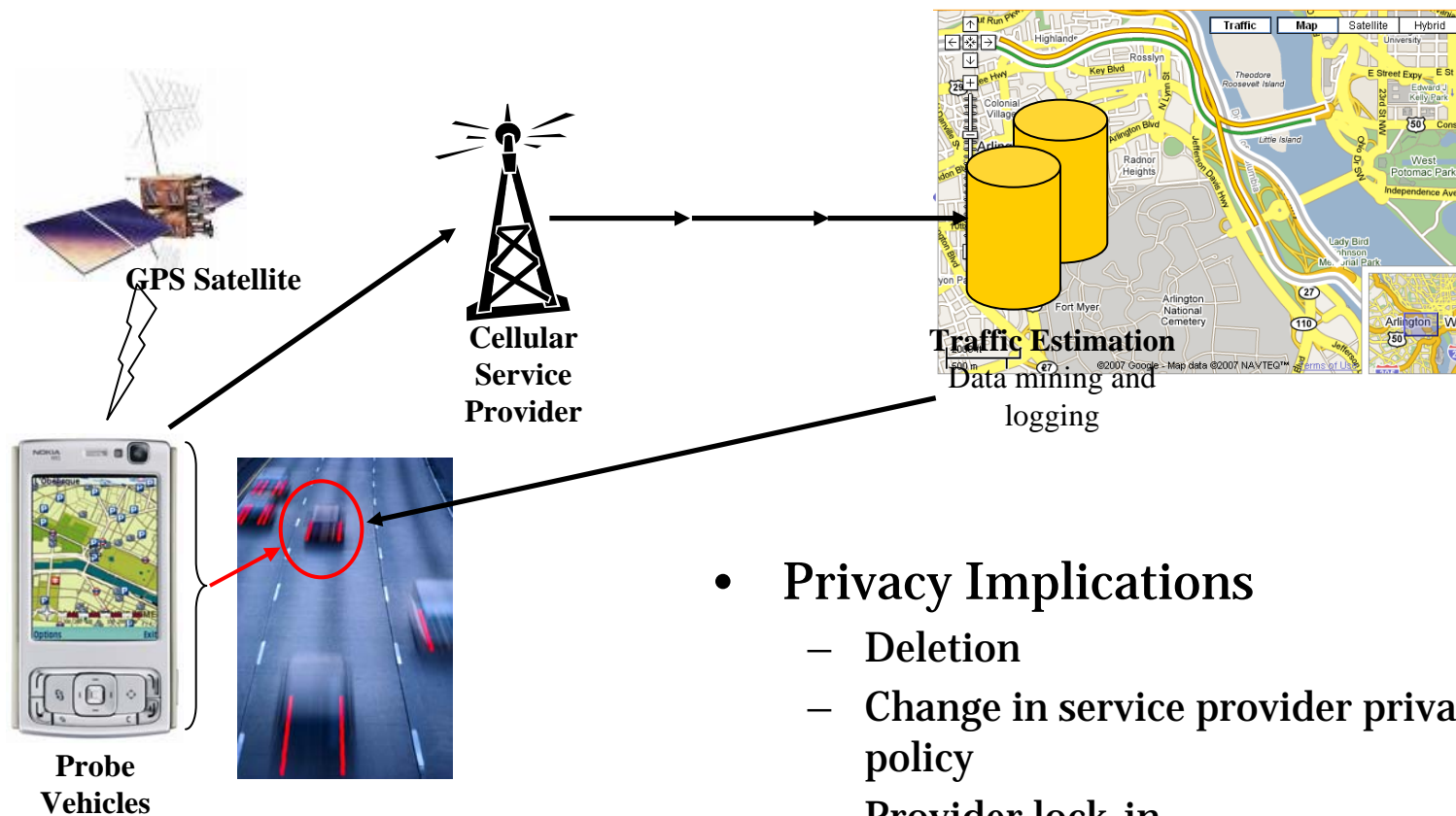
Marco Gruteser

WINLAB

Trend Towards Data Storage in Cloud: Privacy?

GPS Satellite

Cellular
Service
Provider

Traffic Estimation
Data mining and
logging

Probe
Vehicles

- Privacy Implications
  - Deletion
  - Change in service provider privacy policy
 - Provider lock-in
  - Subpoenas

# Recent Controversy about Human Mobility Article Demonstrates Location Privacy Sensitivities

- **Analyzed human mobility patterns from cell phone hand off data**
  - 100,000 users over 6 months
- **Coarse data**
  - Cell tower location recorded for each call / message
  - Average towers covered 3 km^2

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Inferences from Detailed Location Traces

- **Embarrassing or inaccurate inferences**
  - Medical clinic visits
  - Nightclub visits
  - ...
- **Fraud & Theft**
  - Burglaries
  - Credit Cards ?
- **VIP business meetings**
- **Physical Risk**
  - Stalkers
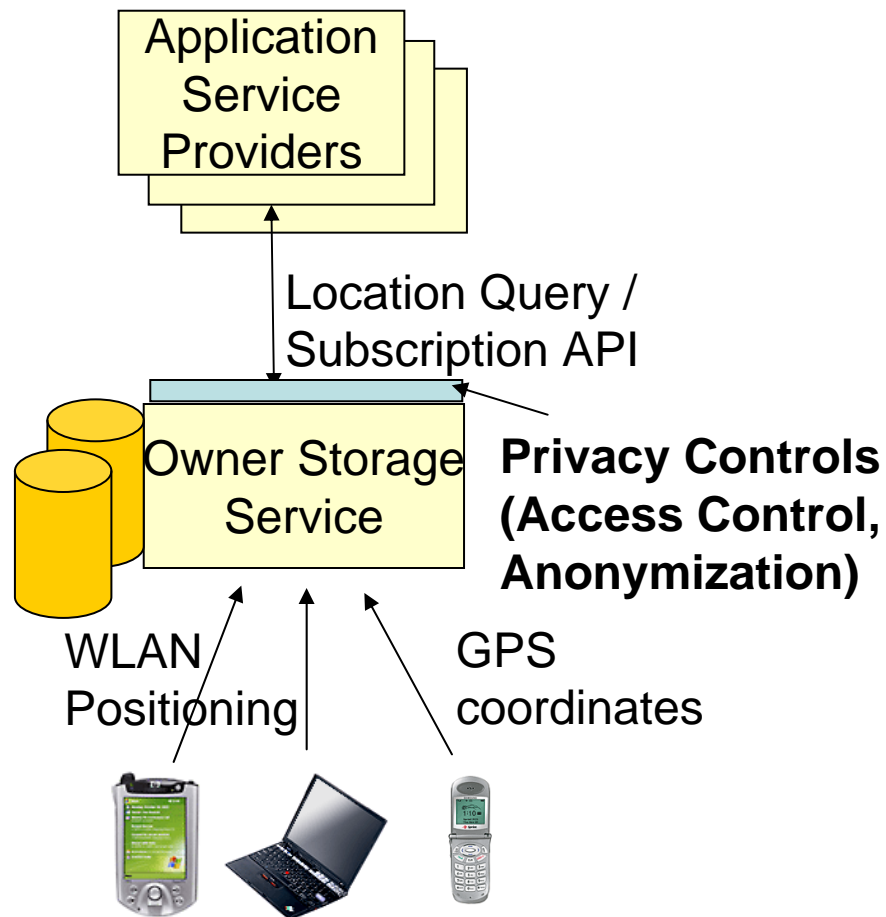- **Minor traffic infractions**
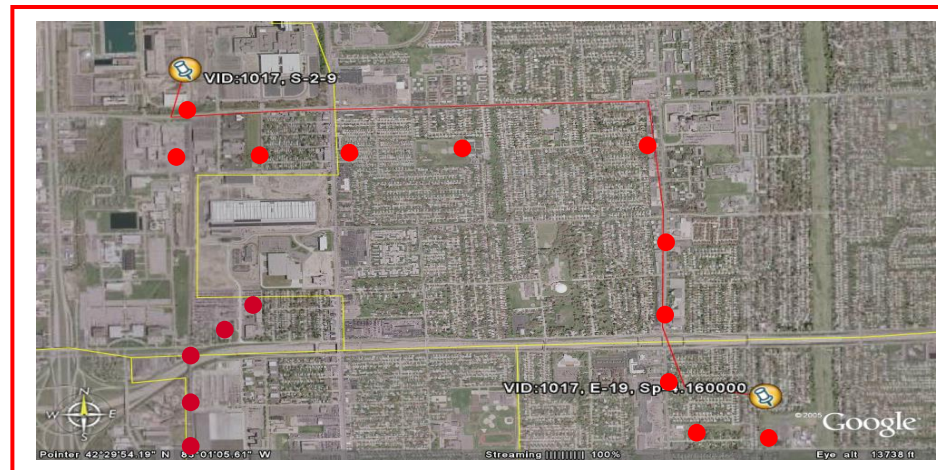
Tracking algorithms recover individual trace [Hoh05] (Median trip time only 15min)
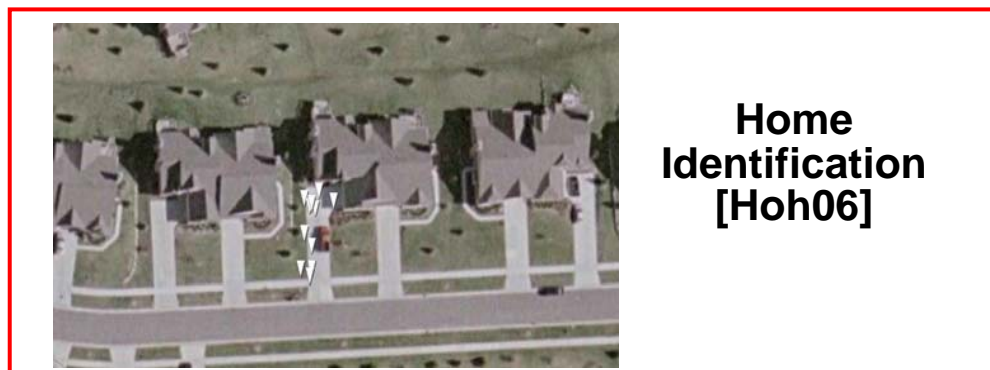
Home Identification [Hoh06]

Location may be precise enough to identify home

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A Privacy Solution: Owner-controlled Storage Server

Application Service Providers

Location Query / Subscription API

Owner Storage Service

Privacy Controls (Access Control, Anonymization)

WLAN Positioning

GPS coordinates

- Separate data storage from processing
  - Storage service controlled by data owner (data subject)
- Location governed by legal terms
  - Home
  - ISPs outside country?
- Open standards to allow moving services and data between different service providers

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