The Case for Opportunistic Communication

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Outline

- **Vision**
- Taxonomy
- Requirements
- Architecture
- KioskNet
- Challenges

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Vision (2002)

- Untethered mobile devices will communicate with resource-rich data centers over wireless and wireline networks
- Why?
  - Computing costs are plummeting
  - Wireless networks are proliferating
  - Data centers aggregate resources

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Opportunities

- Assume that any mobile node can communicate *opportunistically* with any other node, fixed or mobile
  - New applications:
    - Wireless P2P content dissemination
    - Mobile social networking
    - Opportunistic/mobile blogging
    - Drive through Internet
    - ...

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Categories

- One hop
  - Campaignr
- One hop to a ferry
  - KioskNet, GaTech message ferry, Data Mules
- More than one hop
  - Haggle, DieselNet, ZebraNet

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What is common?

- *Non-intrusive* opportunistic communication
- Disconnection, disruption, and delay tolerance
- High bandwidth
- Low cost

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Communication Requirements

- Legacy compatible
  - Minimal change to clients and servers
- Maximum use of communication opportunities
- Support for single- and multi-hop communication
- Over-the-air security
- Session persistence despite mobility and disconnection

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System Requirements

- Autonomous NIC management
  - Find and use the best NIC, now and in the future
  - Turn costly NICs on, only when there is an opportunity to save power

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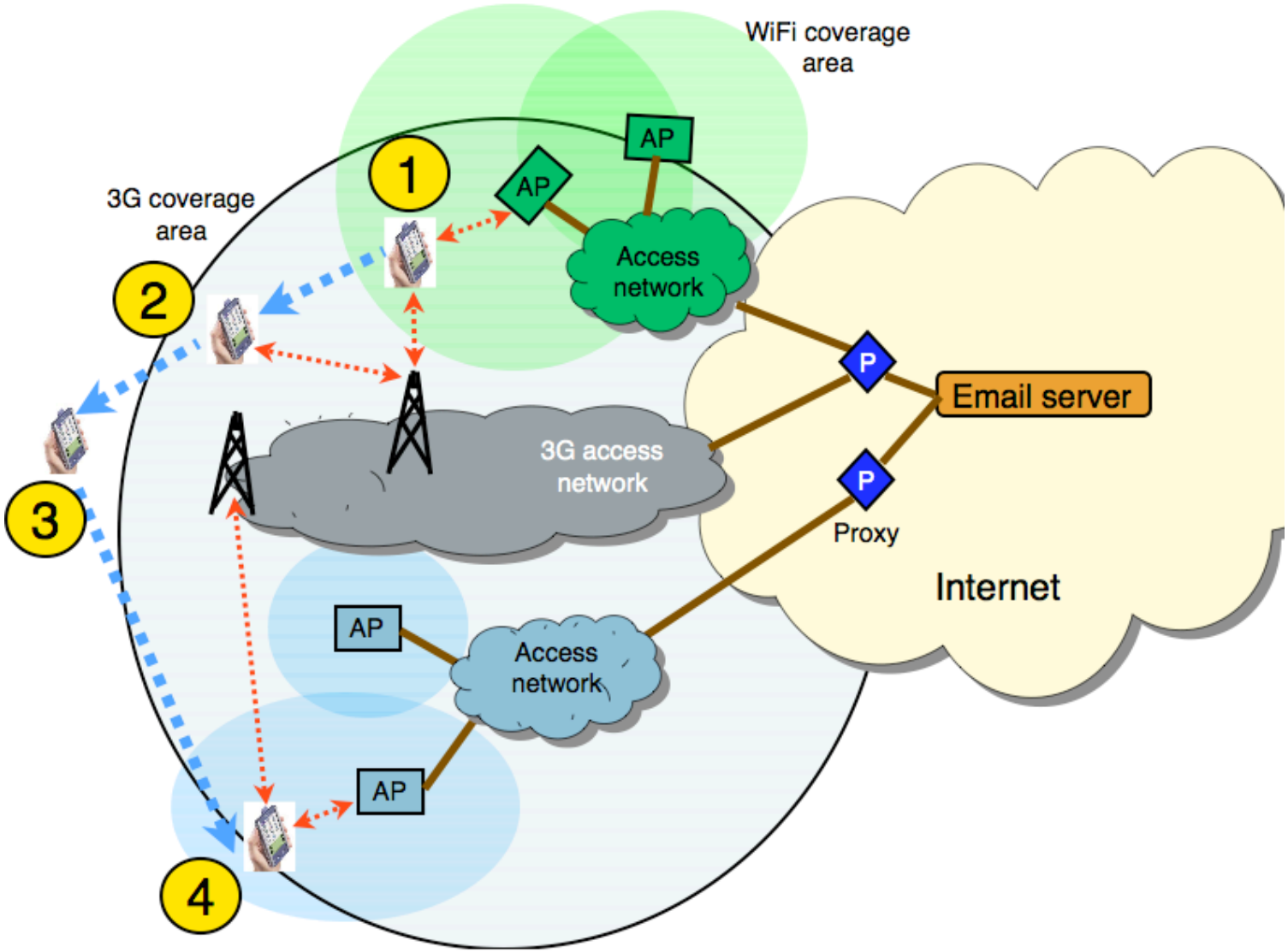
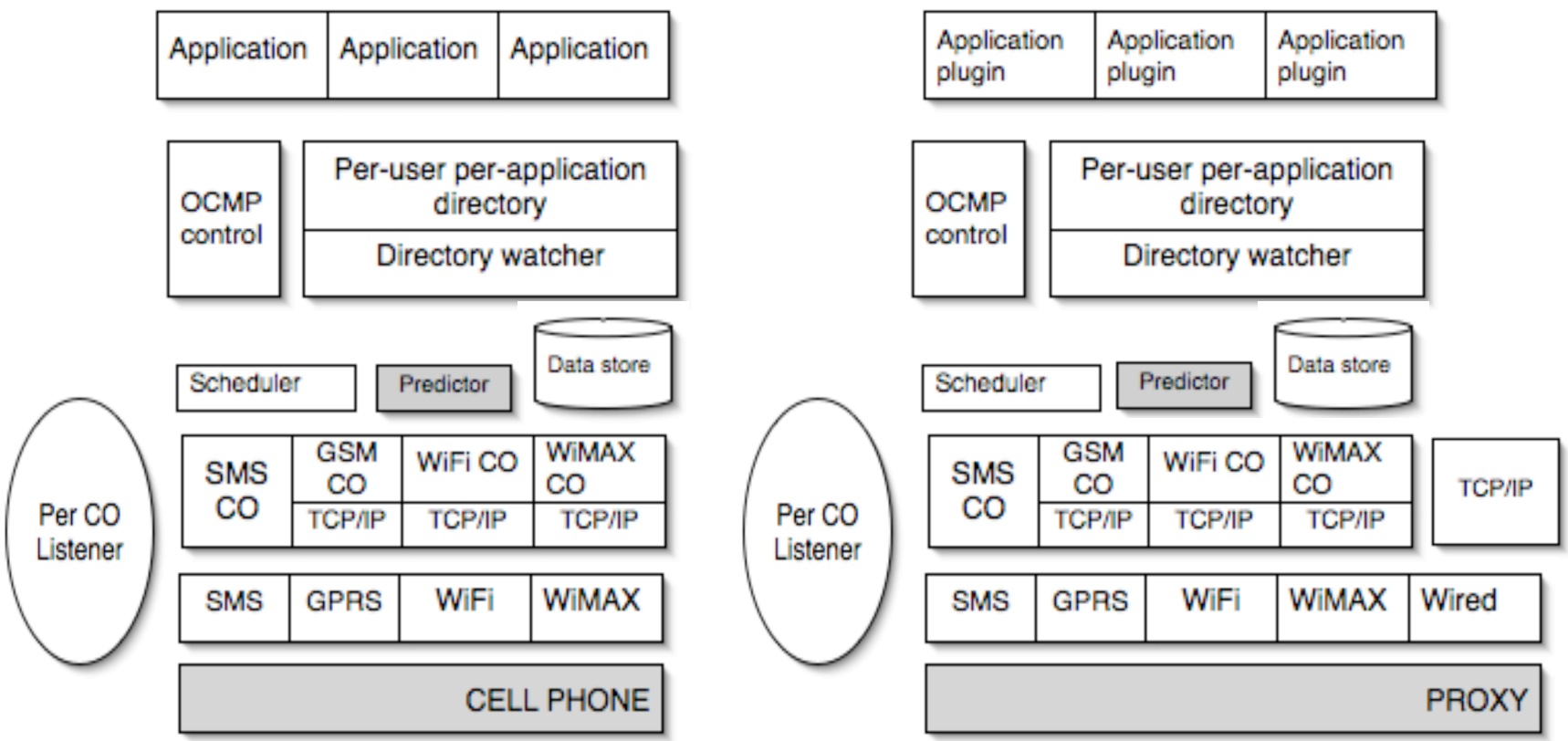
OCMP


WiFi coverage area
3G coverage area
1
2
3
4
AP
AP
AP
AP
Access network
Access network
3G access network
P
P
Proxy
Email server
Internet

Software Architecture



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OCMP Applications

- Each app has two parts:
  - The client side
  - The proxy plug-in
- Example applications:
  - OMail
  - OTube
  - OFlickr

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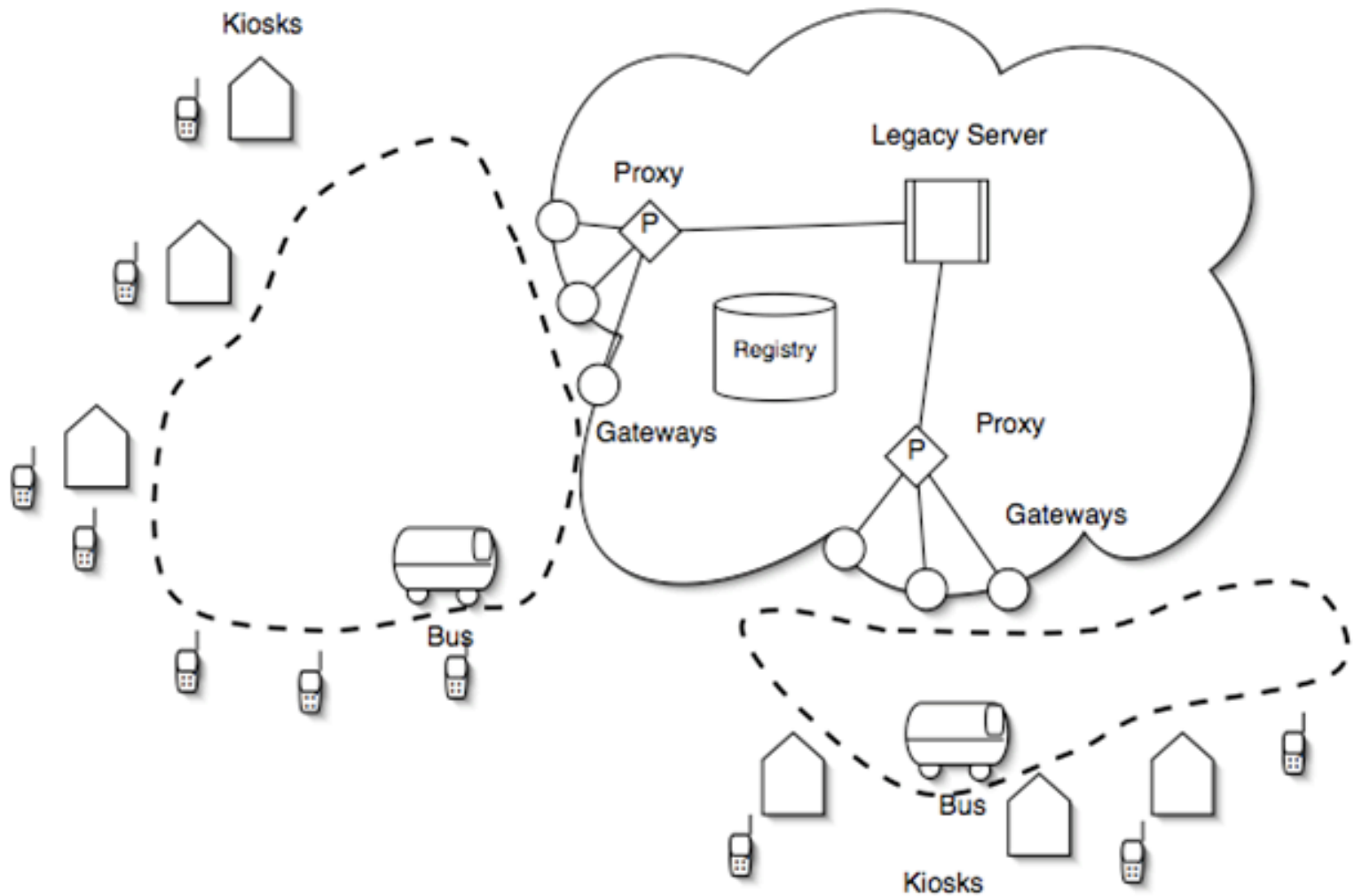
KioskNet



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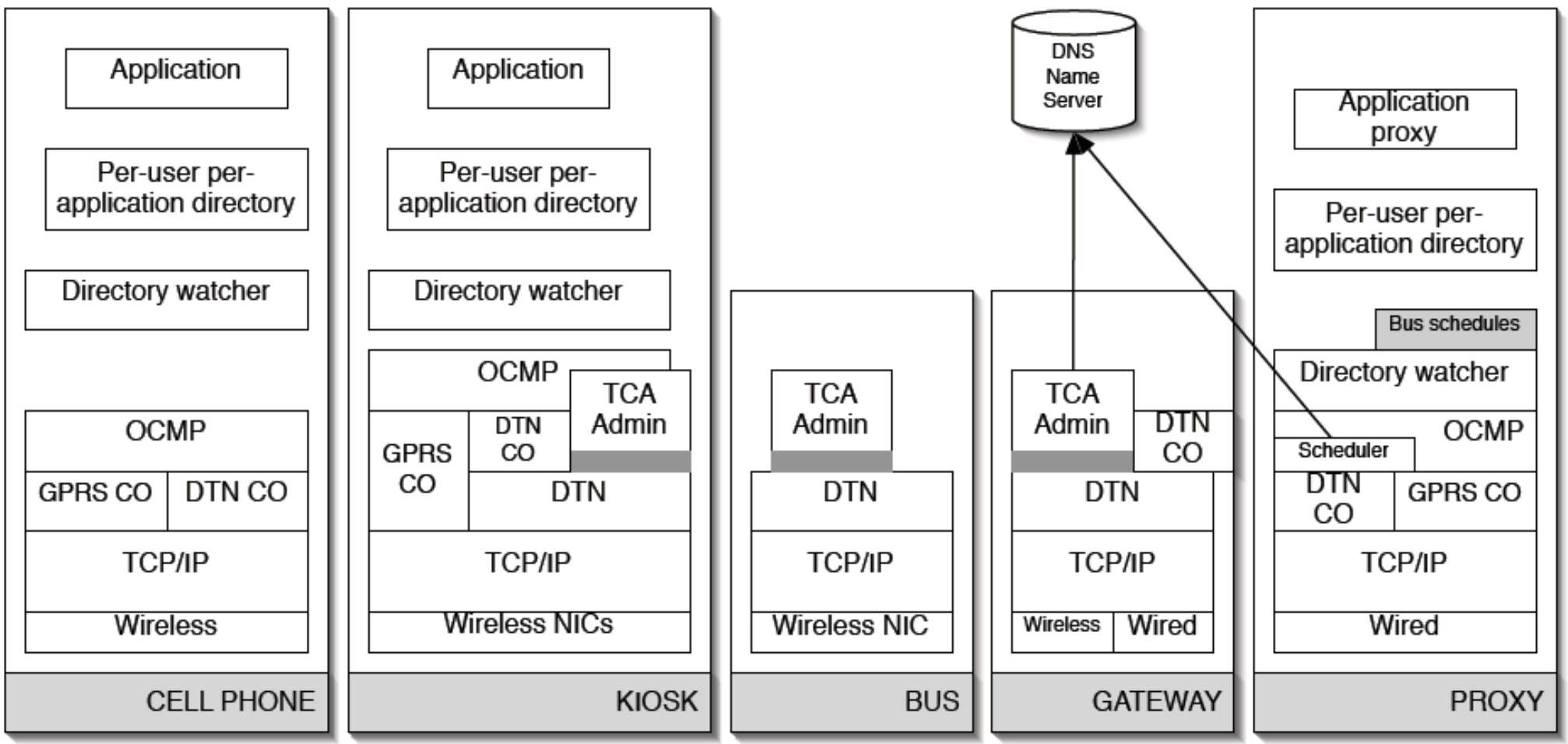
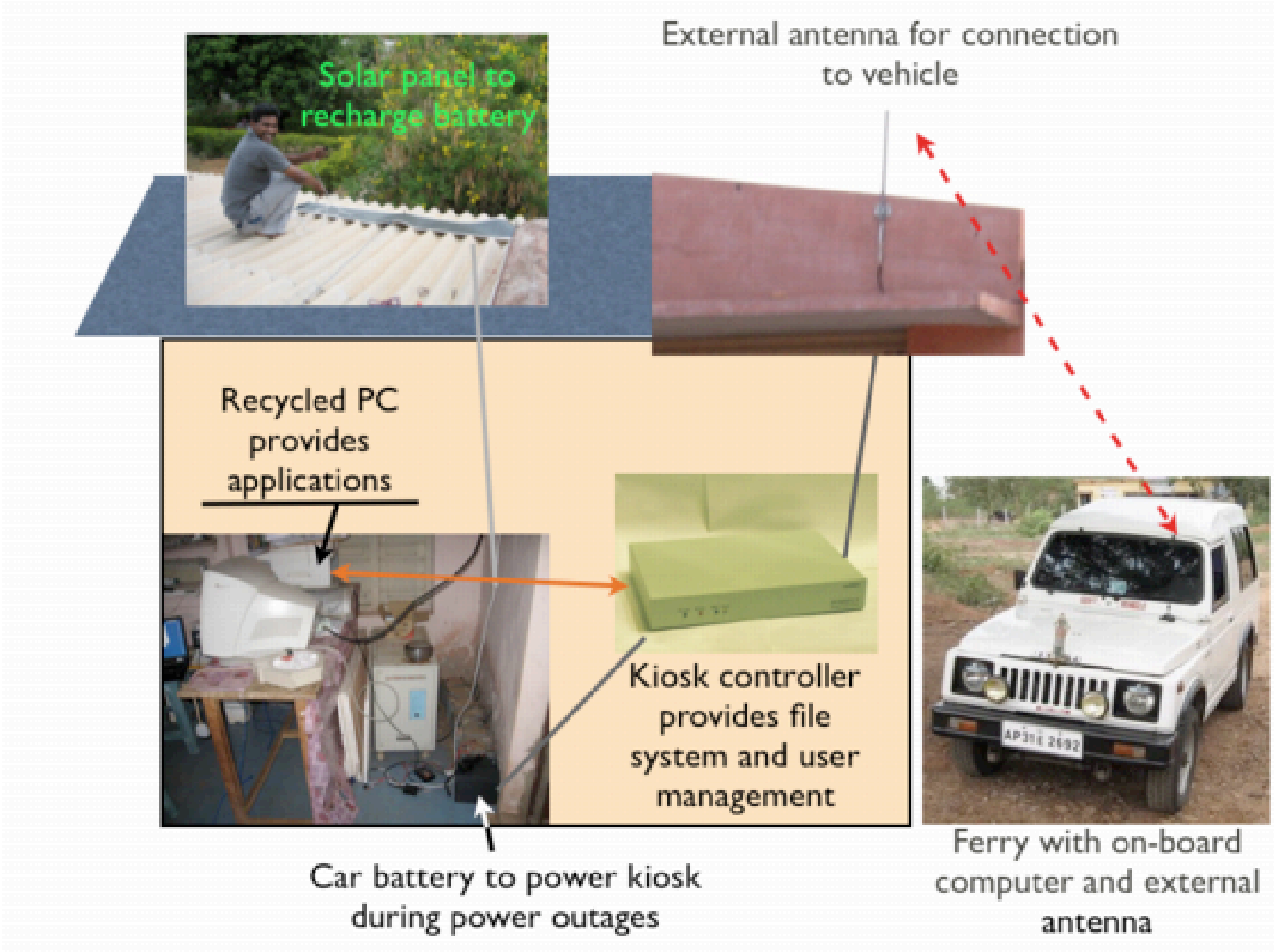
Software Architecture



Implementation



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KioskNet Apps

- OMail
  - To send and receive emails to any Internet user or KioskNet user
- OTube
  - To subscribe to and download videos from YouTube or any other video feed
- OFlickr
  - To upload photos on Flickr

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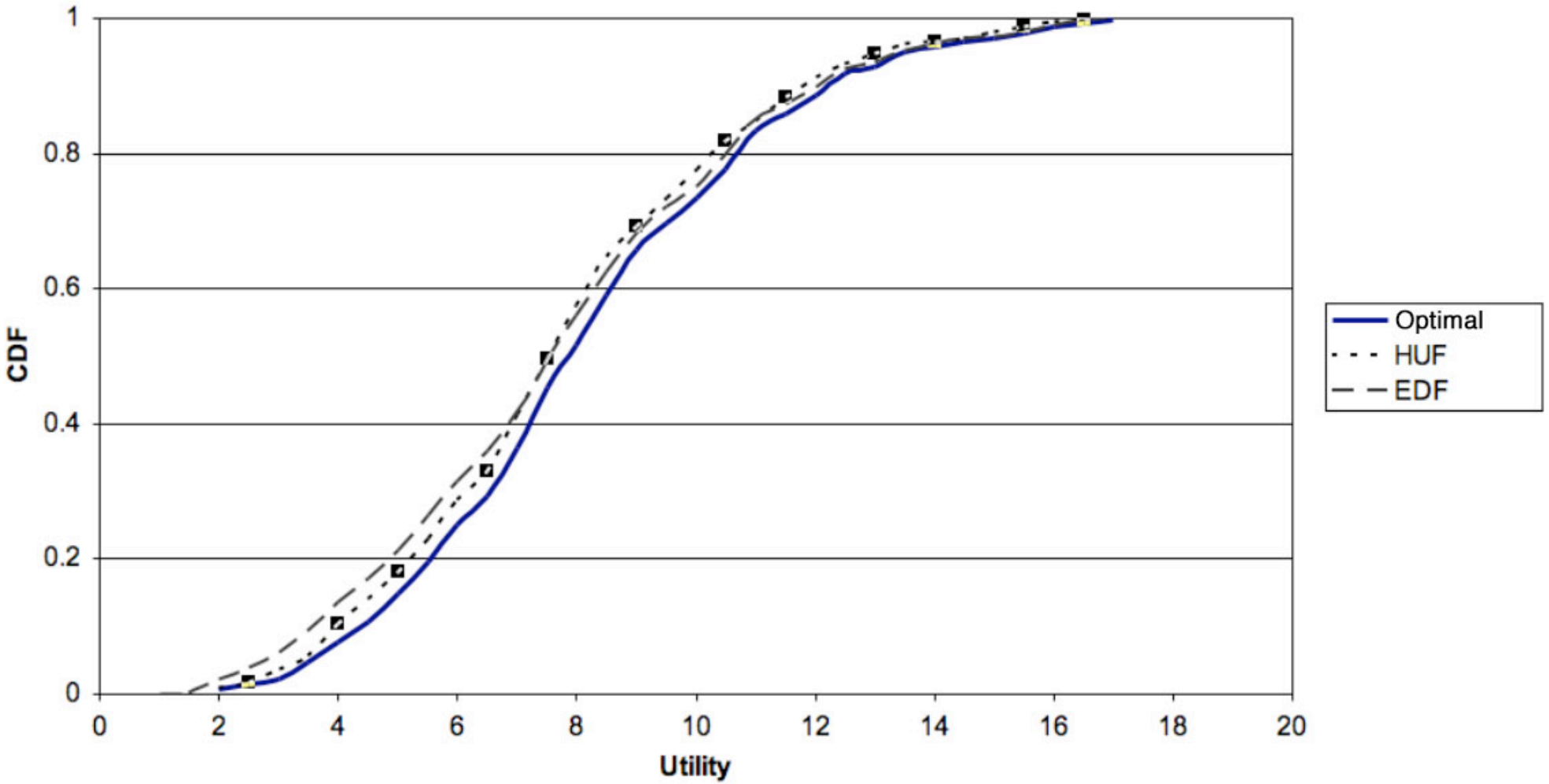
Multiple NICs

- Scheduling over multiple NICs



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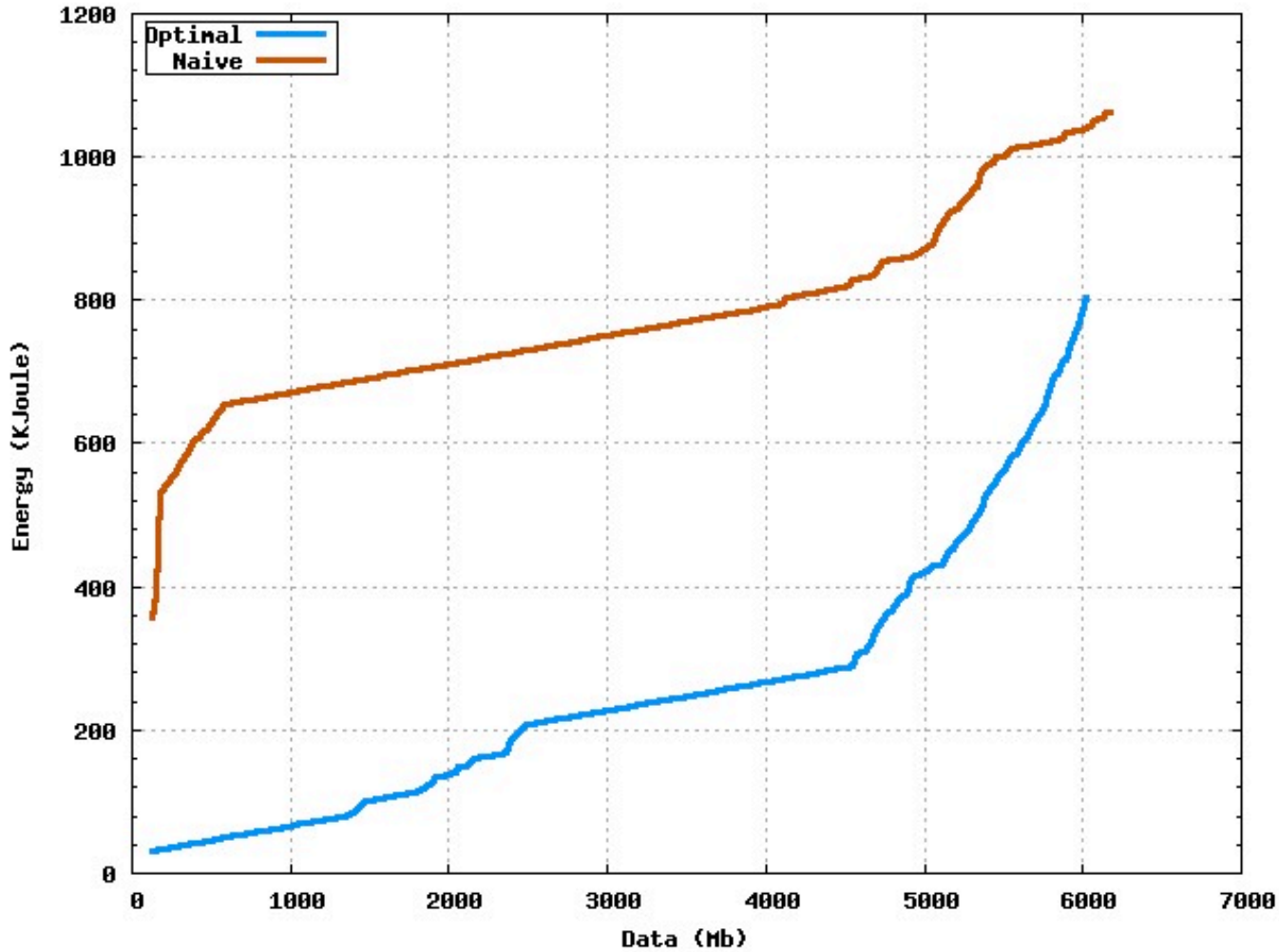
Enabling the NIC

- When to turn on costly NICs



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Open Problems

- Cooperative scheduling
- Routing
- Credibility

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Summary

- Opportunistic communication allows new classes of applications
- OCMP provides a platform for opportunistic communication
  - Interesting research problems
  - Ease of mobile application development

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