MobiSys 2007

Selected papers

Hossein Falaki
Papers

• Context-for-Wireless: Context-Sensitive Energy-Efficient Wireless Data Transfer
• Wireless Wakeups Revisited: Energy Management for VoIP Over Wi-Fi Smartphones
• Triage: Balancing Energy and Quality of Service in a Microserver
Introduction
Context-for-Wireless vs Cell2Notify

• **Context-for-Wireless**
  – Wi-Fi coverage is not perfect
  – There is always data to send

• **Cell2Notify**
  – Wi-Fi coverage is perfect
  – Sometimes there is data to send/receive
Context-for-Wireless

Ahmad Rahmati and Lin Zhong
Context-for-Wireless
Problem Definition

• Network availability is decent, but ...
• Energy costs pose a great challenge for ubiquitous mobile connectivity.
• How to tackle this problem?
Context-for-Wireless

Reality Check

- Best cellular and Wi-Fi signal strength in 48 hours observed by a participant
Context-for-Wireless
Reality Check

• Application requirements
Context-for-Wireless

Idea

• Turn the Wi-Fi interface off by default
• Try to use Wi-Fi only in places where there is Wi-Fi coverage
• The problem is reduced to “predicting” coverage
  – Naïve and Simple Solution
  – Hysteretic Estimation
  – History and Cell ID Estimation
Context-for-Wireless Evaluation
Wireless Wakeups Revisited (Cell2Notify)

Yuvraj Agarwal, Ranveer Chandra, Alec Wolman, Paramvir Bahl, Kevin Chin, Rajesh Gupta
Cell2Notify
Problem Definition

• High energy consumption of Wi-Fi interfaces is a significant barrier to VoIP over Wi-Fi.
• What is a “deployable” solution to the problem?
Cell2Notify Architecture

1. Initiate VoIP Call
2. Call Cell Number
3. Enable Wi-Fi & Register
4. Setup VoIP Call
5. VoIP Call over Wi-Fi Connected end-to-end

SIP Caller

Cell2Notify Server

Cell2Notify Client

PSTN

Wi-Fi interface

Cellular interface

Cellular Network

Base Station

Access Point

LAN
Cell2Notify Evaluation (Battery Life)

![Bar chart showing battery lifetime comparison between using WiFi and Cell2Notify for users Beth, John, and James.](chart.png)
Cell2Notify
Evaluation (Delay)

![Graph showing latency comparison between prototype and expected latency](image-url)
Triage: Balancing Energy and Quality of Service in a Microserver

Nilanjan Banerjee, Jacob Sorber, Mark D. Corner, Sami Rollins, Deepak Ganesan
Triage
Problem Definition

• Microservers are battery-powered in-network nodes that serve as aggregation points and gateways
• Providing QoS guarantees for these services can be extremely energy intensive
Triage Architecture

Network Requests

- Query Processing Surrogate
  - Delayed Request Log/Cache
  - Tier-0 Subsystem (Mote)
    - Hardware Power Measurement
    - Tier-1 Subsystem (Stargate)
      - Task Execution

- Storage Surrogate
  - Profiler
  - QoS Scheduler
  - Task 1

- Forwarding Surrogate
  - Task 2

Triage
Prototype
Triage Evaluation

- **PSM-DVFS**: single-tiered dual radio system using WiFi PSM and DVFS (dynamic voltage frequency scaling)
- **WoW***: Wake-on-Wireless
- **Triage**: Two tier architecture with profiling and scheduling
Triage Evaluation (Power)
Triage Evaluation (QoS)