Precise Power Characterization of Modern Android Devices

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In brief...

- Android power consumption is bad
  - "The Galaxy S is great... but the problem is that you stop having a Galaxy S around 10 PM."
- Hardware vendors keep blaming Google
- Google keeps blaming hardware vendors
- *Where is the power going?*

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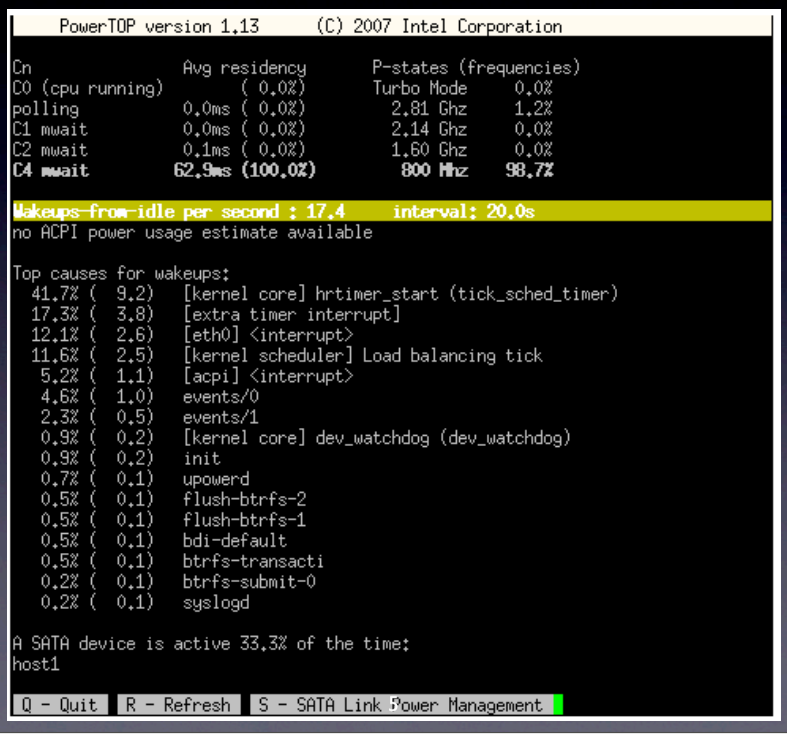
Overview

- *Motivation*
- *Overview*
- State of the art
- Deficiencies in current mechanisms
- Goal: cold hard numbers!

Measuring power today

- Android is just a Linux machine...
  - ...so use Linux power instrumentation tools!
- PowerTOP
  - Measures *CPU wakeups per second*
  - How deep is the CPU sleeping?
  - http://www.lesswatts.org/projects/powertop/

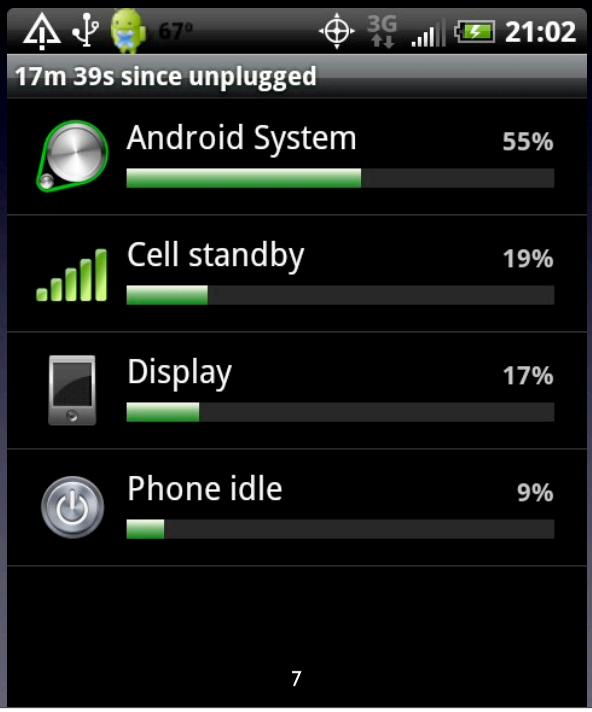
PowerTOP



Android built-in

- Android has built-in power monitoring
  - “battery usage”
- Provides figures for:
  - screen consumption
  - cell consumption
  - per-app battery consumption

Android built-in



Status quo: not good enough

- These tools only give *part of the picture*
- Android tool has potential
  - ... but in reality, is poorly tuned
  - ... but in reality, has poor knowledge of real CPU usage / power correlation
- PowerTOP can assist
  - ... but does not translate to power usage

Towards a *real* model

- We propose to produce a detailed model of various devices on an Android system and their power impact
  - specifically, the HTC EVO 4G
    - because it's the phone that Joshua has
- Spend time with a current probe, measuring the system...
  - in idle; waking up often, but doing little; waking up often, but doing lots; with various radios on; with various radios doing various amounts of traffic

End result

- A *tool* to measure power over time on a specific Android phone
  - probably a sense resistor, a DAC, and an FPGA or some such sampling the DAC
  - connected to battery port, not to USB!
- A *model* to take a known usage pattern and predict power
  - answer: *where is all the power going?*

Q & A

http://moroso.emarhavil.com/~joshua/743wiki/