Power Consumption in Linux
Outlines

- Reduce Power Consumption
- Utilities
- Power Management Kernel API
- GTA01/GTA02 issue
Kernel and application XIP

- Flash consumes much less power than SDRAM
- executing kernel and applications directly from NAND flash (no copy to RAM) --> consuming less power
Kernel Configuration

- NO_HZ (Tickless system) in Kernel feature
  - the processor receives a timer interrupt at a given frequency (every 4ms)
  - On idle systems, disable the timer interrupt, and re-enable it when a real interrupt happens
Kernel Configuration

- CPU_FREQ in Power Management
- Dynamically change CPU frequency
Utilities

- **PowerTOP**
  - Show top 10 sources of power consumption
  - [http://linuxpowertop.org](http://linuxpowertop.org)
  - non Intel processors probably not supported
Power Manager Kernel API

- **pm_register** — Add a device to the list of devices that wish to be notified about power management events
- **pm_unregister** — Remove a device from the power management notification lists
- **pm_unregister_all** — Unregister every device that would call the callback passed
- **pm_send** — send request to a single device. The PM_SUSPEND and PM_RESUME events are handled specially
- **pm_send_all** — send request to all managed devices
- **pm_find** — Scan the power management list for devices of a specific type
GTA01 Power Issue

- LM4857/GSM drain power when GTA01 enter suspend/shutdown mode
- Power down LM4857 in lm4857_suspend and lm4857_shutdown
- Steps
GTA01 Power Issue

- static struct i2c_driver lm4857_i2c_driver = {
  - [snipped]
  - .suspend = lm4857_suspend,
  - .shutdown = lm4857_shutdown,
  - [snipped]
  - }

GTA02 Power Issue

- power consumption devices
  - LCM
  - BT
  - Wireless LAN
  - GSM
  - WM8753
  - AMP
  - SDRAM/FLASH LIS302DL GLAMO CPU2442
Reference

- http://free-electrons.com
- http://elinux.org