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
  - 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