



Improving Linux Laptop battery life

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Topics

- Spoiler
- Why not just run powertop / TLP?
- Enabling autosuspend for USB Bluetooth
- Enabling autosuspend for Intel HDA codecs
- Enabling SATA link PM by default
- Enabling i915 Panel Self Refresh by default

Spoiler

What is this about?

- Enabling a number of power-management features which default to off
- Tested on an idle T440s at 50% brightness
- Together these drop the idle power-consumption from 7.9W to 5.6W
- For powerusers `powertop --auto-tune` or TLP already enables most
- Powerusers may still save an extra 0.5W by watching this talk :)

Why not just run
powertop / TLP?

Why not just use ...?

- The OOTB experience matters (a lot)
- Not draining the battery should just work, for all Linux users
- TLP and esp. powertop can cause problems:
 - Non working USB keyboards/mice (powertop)
 - Data corruption with some SATA SSDs (both)

Enabling autosuspend for USB Bluetooth controllers

Autosuspend USB BT

- If all USB devices are autosuspended, the USB controller suspends saving $\pm 0.4W$
- Only device without autosuspend on many laptops is the Bluetooth HCI
- Wrote a kernel patch to allow enabling autosuspend by default through Kconfig
- Wrote another patch to disable this for atheros and realtek devices

Enabling autosuspend for Intel HDA codecs

HDA Autosuspend

- Allowing HDA to power-off when idle saves aprox 0.4W
- `SND_HDA_POWER_SAVE_DEFAULT=1` in `Kconfing`
- Causes plops / crackles on some devices
- Created a hwdb based blacklist matching on pci subsys ids and DMI strings
- Will submit this upstream soon

Enabling SATA ALPM by
default

Enabling SATA ALPM



- Without ALPM, the CPU package cannot enter deeper sleep states than PC2
- Enabling ALPM saves 1 – 1.5W !
- Linux kernel min_power setting is known to cause disk corruption issues (oops)
- Wrote a new med_power_with_dipm policy mirroring Windows IRST defaults
- Enabled in Rawhide / Fedora 28 since January 1st

Enabling i915 Panel Self
Refresh by default

Panel Self Refresh

- PSR saves $\pm 0.5W$ when available
- Defaults to off because it is known to cause issues on a lot of devices
- Did a blogpost asking for testing:
<https://hansdegoede.livejournal.com/18653.html>
- Got over a 100 reports, results are not good, this causes issues on many devices.
- Plan to create a whitelist matching on both DMI (laptop model) and EDID (panel) info.

Ideas? Suggestions? Questions?



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Git repositories:

<https://github.com/jwrdegoede/>