Which timer infra for runtime pm ?

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Agenda

- Runtime PM autosuspend
- Move on hrtimer
- Impacts and constraints
- Statistics

Runtime PM autosuspend

- Based on timer and jiffies

- Min granularity is between 1 tick and 2 ticks
  - Which means [4-8 ms[on arm64
  - And [10-20 ms[on arm32

- 8 ms is quite long
  - At least on embedded systems

Runtime PM autosuspend

- Example : autosuspend sets to 1ms for GPU on an arm64 platform
  - Timeout moved from the lower bound to the higher bound (4 to 8ms)
 - Power impact to wait 7 more ms before power gating

- What if we can be closer to 1ms ?
  - Finer grain is only necessary for short timeout

Move on hrtimer

- Get better granularity
  - Up to HW capabilities

- Take advantage of slack to gather updates
  - Similar to what is done above 1 seconds with timer
  - 12% of slack
  - Keep short autosuspend accurate
  - Gather long autosuspend in one wake up

Power impact

- Back on the 1ms autosuspend of the CPU
  - 10% of power decrease for GPU for idle case
- GPU voltage domain

Timer

HrTimer
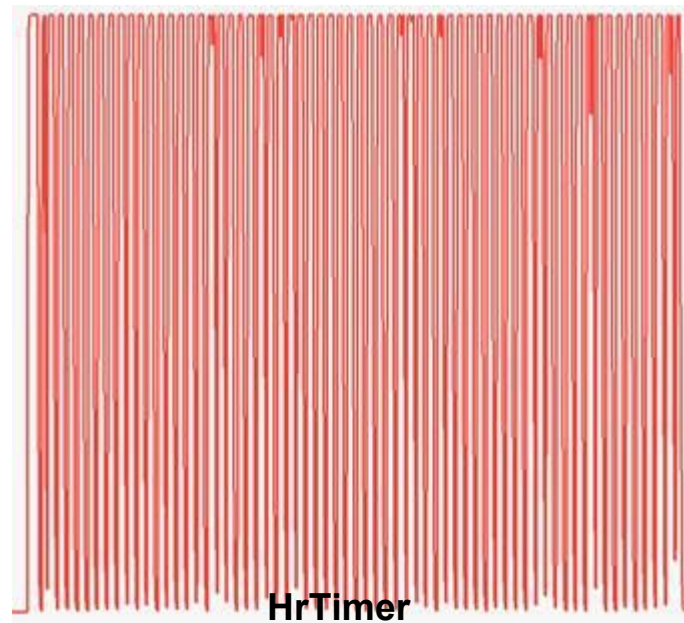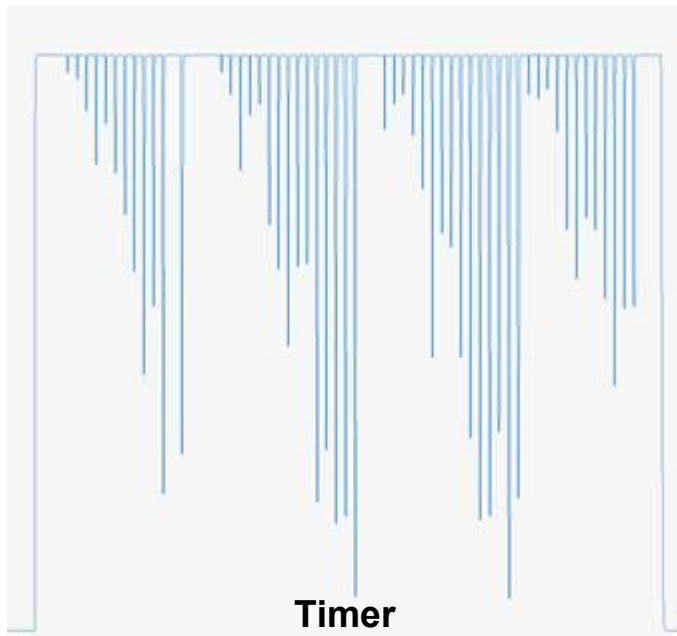
Perf impact and constraint

- Move on ktime

- Use 64bits variable
  - Impact on 32bits arch

- Performance impact ?
  - mark_last_busy : +5% on hikey arm64 octo cores
    - 1.05 usec vs 1.11 usec
  - rpm_suspend: -5% on hikey arm64 octo cores
    - 14.92 usec vs 14.21 usec

PM runtime statistics

- Based on jiffies

- Anything lower than 1 tick might be not seen
  - 4ms on arm64
  - 10ms on arm

- Move on ktime
  - Get better statistics
  - Aligned with genpd

What else to take care ?

- Early boot availability
  - Availability at early boot ?
  - Use ktime_get_mono_fast_ns instead ?

Thank You

For further information: www.linaro.org