

# Errors in PELT signal due to period boundary

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## Introduction

The PELT signal (`sa->load_avg` and `sa->util_avg`) are not updated if the amount accumulated during a single update doesn't cross a period boundary. This is fine in cases where the amount accrued is much smaller than the size of a single PELT window (1ms) however if the amount accrued is high then the error (calculated against what the actual signal would be had we updated the averages) can be quite high - as much 3-6% in my testing. On plotting waveforms of the signals, I found that there are noticeable glitches in the waveform that could have been avoided had we considered that the accrued amount is high enough that the sum and averages have diverged. Other than glitches, I also see that the signal is slightly lower on many occasions than it could have been.

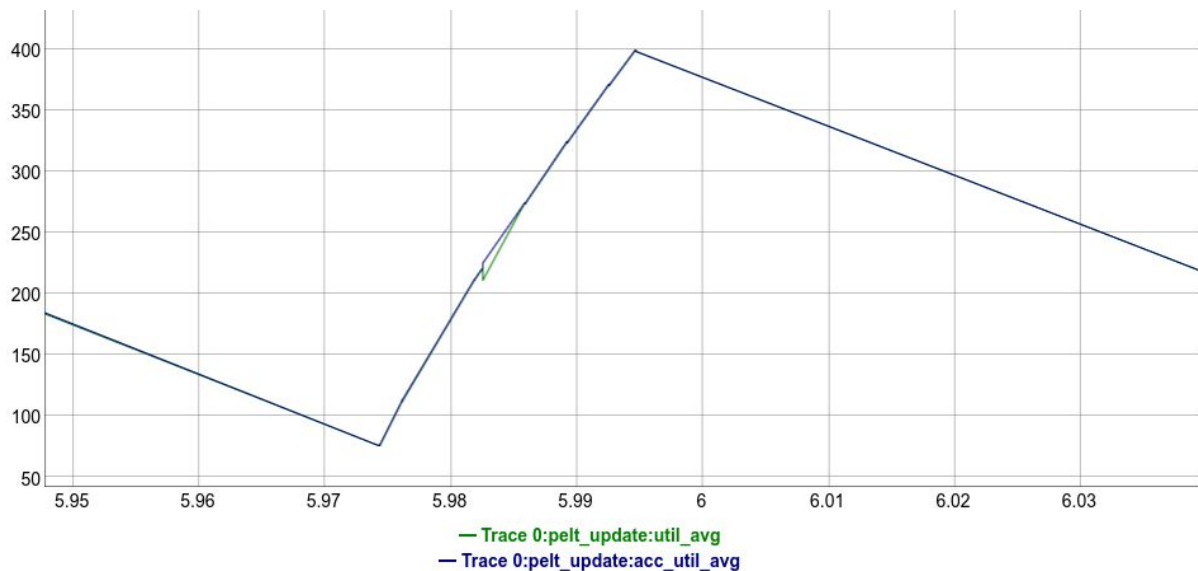
# Summary of issues

## \* GLITCH in signal

At 5.98s, there is a 6% error in util\_avg (225 vs 211) - this causes a glitch and makes the signal less smooth.

Legend: GREEN is actual signal, BLUE is the corrected signal.

X-axis is time, Y-axis is util\_avg signal value for the RQ

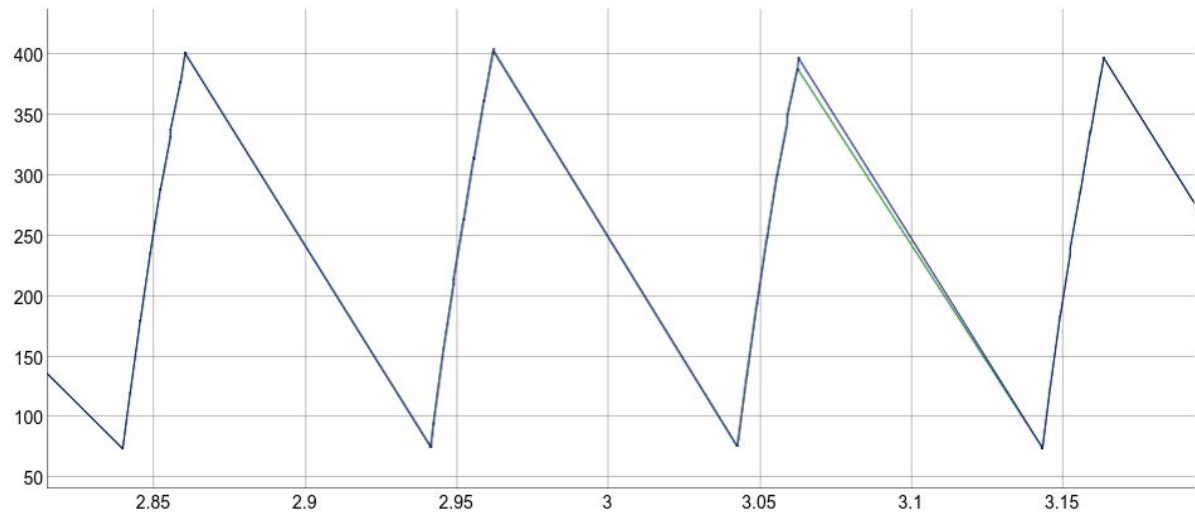


**\* Signal doesn't peak as much as it normally does.**

At 3.06s, there is a 3% error in util\_avg - causing lowered peak of util\_avg (397 -> 387) with delta ~450us

Legend: GREEN is actual signal, BLUE is the corrected signal.

X-axis is time, Y-axis is util\_avg signal value for the RQ



## Fix I'm planning to propose

Inorder to fix this issue, if we are to update the averages when the amount accrued in the current 1ms window crosses a threshold (128us which is 1/8th of the 1ms window), then the errors are significantly reduced.

Data from fixes continued....

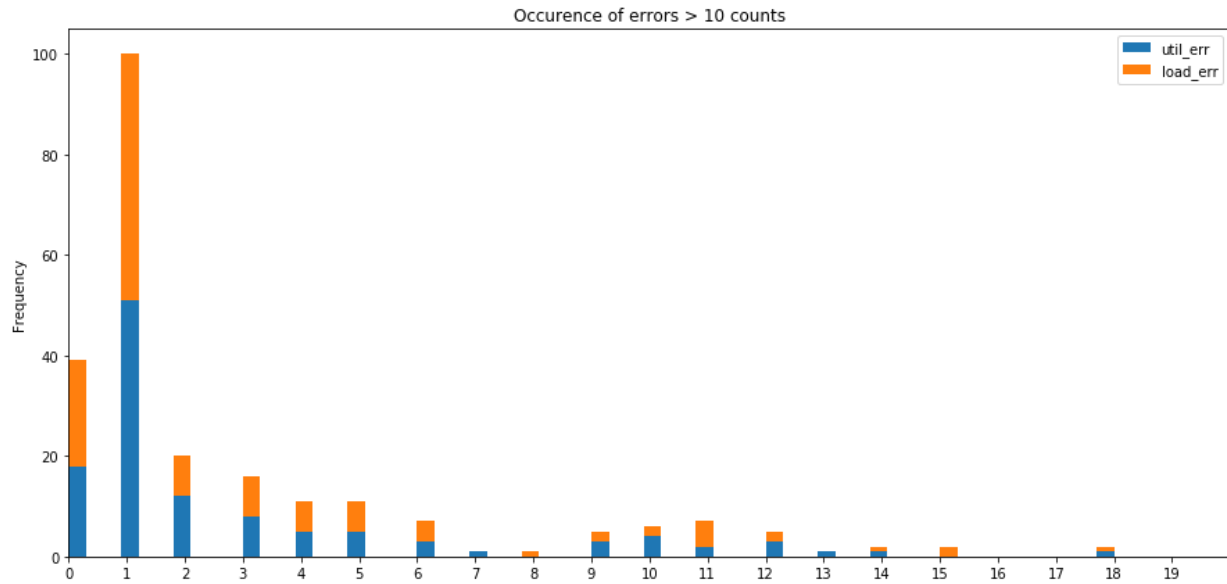
# Histograms with/without fix

X-axis unit is error count (different between actual signal and corrected signal)

Y-axis unit is number of occurrences

These are plotted for both util\_avg and load\_avg:

## Without fix:



## With fix:

