

IEEE802.3bt 4-Pair Power over Ethernet Task Force  
Reducing MPS power during STBY state  
Part 1  
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# Objectives



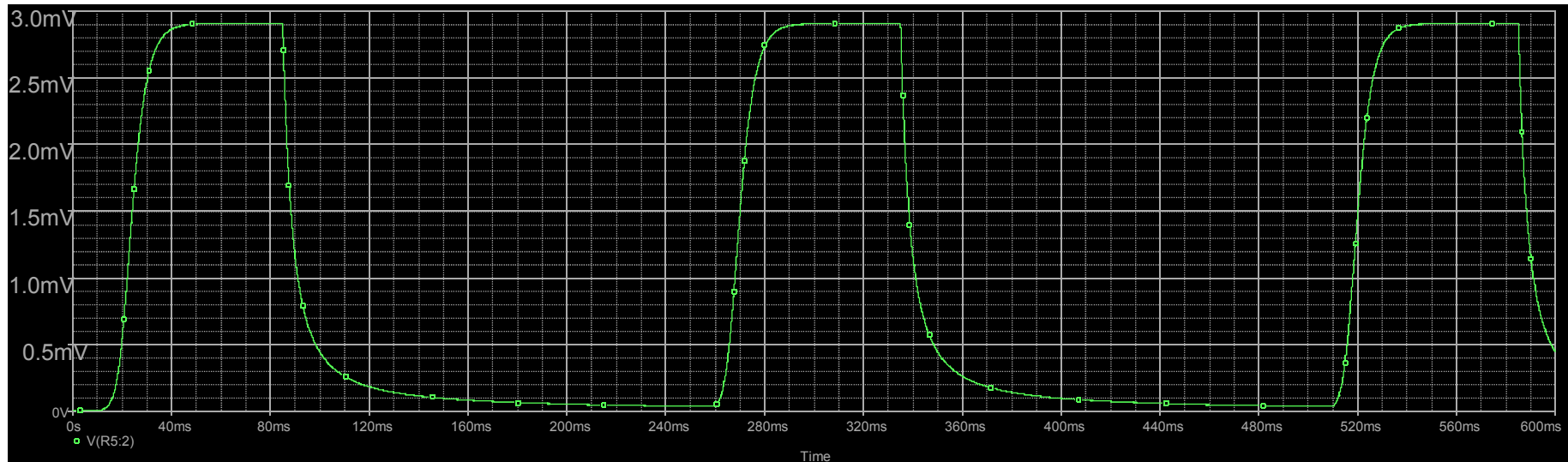
- Analyzing the effects of reducing MPS pulse width from 75msec to lower value in order to reduce STBY average power.

# Background

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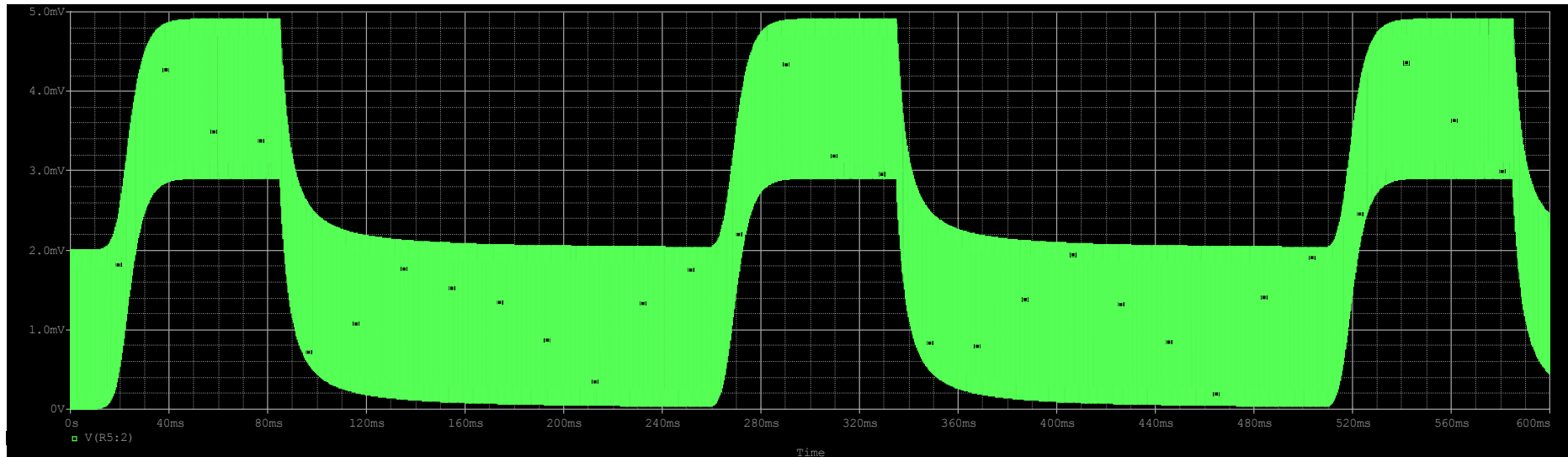
- There is a need presented by lighting vendor(s) for lighting systems to reduce power during STBY.
- In addition, reducing STBY power is a good feature in any system today or in the future which is the incentive for proposals to modify MPS parameters.
- The proposal that we are discussing now, suggests to reduce the MPS power by reducing MPS duty cycle which will result with reducing the average power.
- The average power is  $I_{hold} * TMPS / (TMPS + TPMPDO)$ .
- The focus is reducing TMPS.
- This presentation investigates the implications of reducing TMPS.

# Detected MPS in legacy devices- No noise



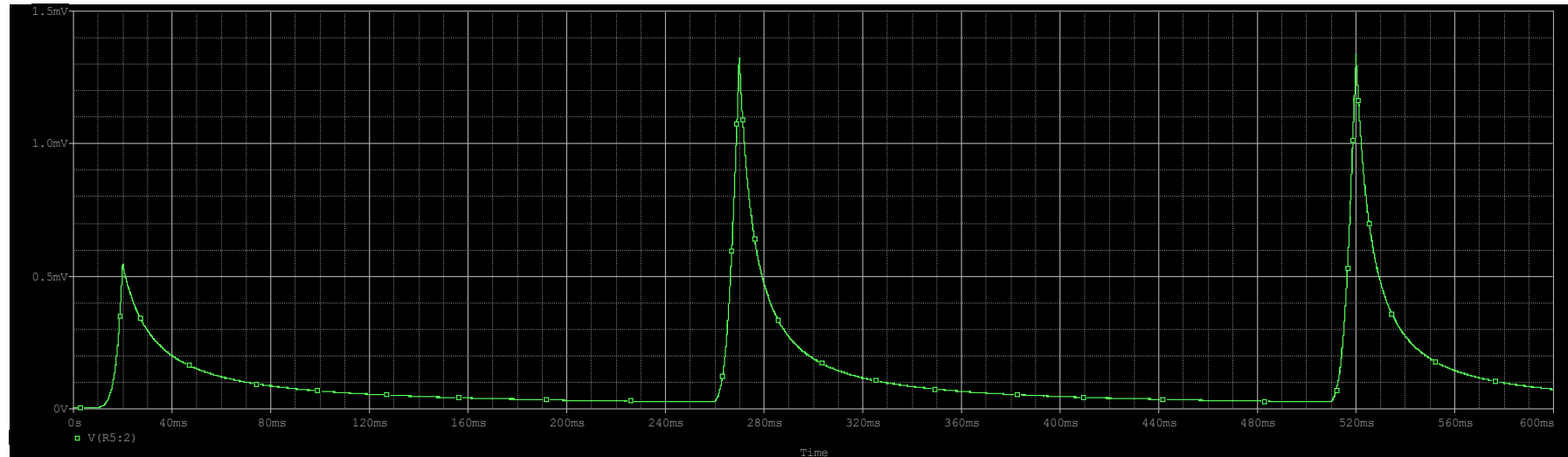
- TMPS: Pulse width=75ms
- This is how it looks when detected at PSE
- No noise. Ideal environment.
- $C_{pd}=180\mu F$ ,  $t_r/t_f$  :~13.6msec/19msec.
- Signal  $V_{pp}\sim 3mV$  over 0.3ohm with 10mA MPS over Mode A or B.
- Easy to handle.

# Detected MPS in legacy devices with some GND noise



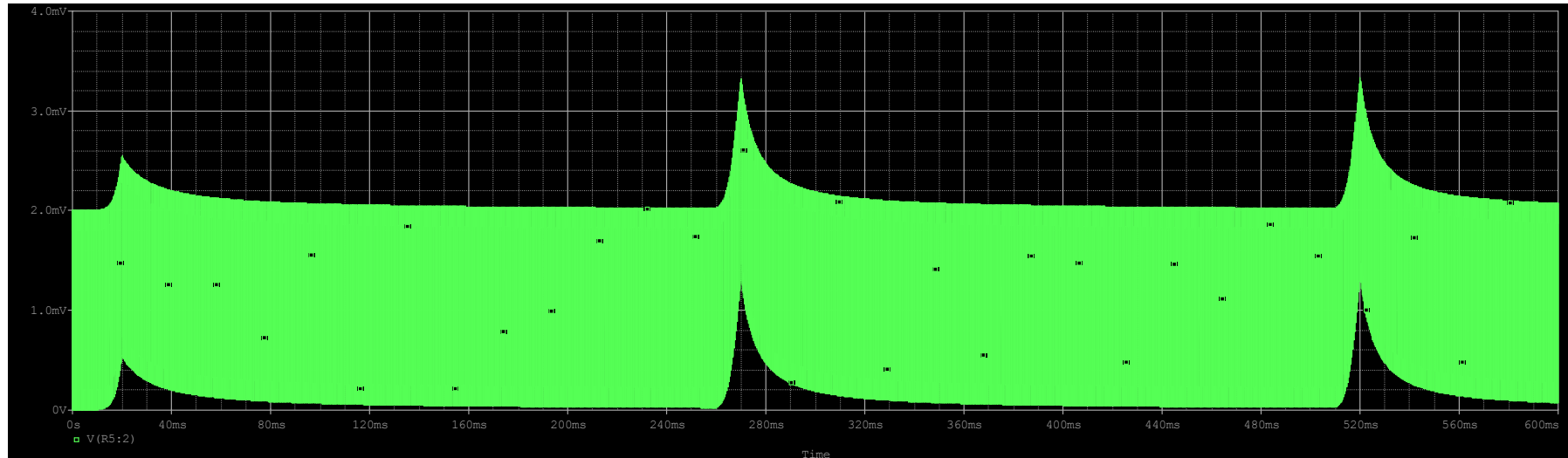
- TMPS: Pulse width=75ms
- This is how it looks when detected at PSE
- Noise: 2mVpp. 1us/50us/1us/100us.
- Signal Vpp~=3mV over 0.3ohm with 10mA MPS over Mode A or B.
- Still easy to handle. Pulse width>75ms.
- Information frequency << Noise Frequency
- Easy to extract the information.

# Detected MPS in legacy devices- No noise.



- TMPS: Pulse width=10ms
- This is how it looks when detected at PSE
- No noise.
- Cpd=180uF, tr/ta :~13.6msec/19msec.
- Signal Vpp~=**1.8mV** over 0.3ohm with 10mA MPS over Mode A or B.
- **This is an issue to address.**
  - (a) detected pulse in PSE is shorter than PD TMPS.
  - (b) lower pulse amplitude (2-3 times smaller)
  - (c) To re-evaluate the cost effectiveness of shorter MPS pulses.

# Detected MPS in legacy devices with GND noise



- TMPS: Pulse width=10ms
- This is how it looks when detected at PSE
- No noise.
- Cpd=180uF, tr/tf :~13.6msec/19msec.
- Signal Vpp~=**1.8mV** over 0.3ohm with 10mA MPS over Mode A or B.
- **This is a potential higher level problem to address.**
  - (a) detected pulse in PSE is shorter than PD TMPS.
  - (b) lower pulse amplitude (2-3 times smaller)
  - (c) Cost effectiveness of shorter MPS pulses is questionable.

# Problem Root-cause

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- Cpd and PD MPS modulator impedance forms slow time constant that distorted the MPS shape received at the PSE.
- It can be seen by very long tr/tf values of the detected pulse.
- It means that if PD MPS is 5msec or 10msec etc. most of it is attenuated by  $tr/tf = 14-19\text{msc} > 5-10\text{msc}$ .
- As a results, longer MPS may be required for cost effective detection and reliable detection in a typical noise environment (which is TBD).



# What if $C_{pd} > 180\mu\text{F}$

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- Much bigger problem.
- To reduce  $C_{ps}$  for lighting applications? – Needs further work.

# What with Logic gates overhead?

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- With the current 75msec MPS a resolution of 4ms was sufficient.
- For 5msec, we need 1msec resolution.
- It is 4 times more gates.
- We need to check if it is cost effective vs. the power saved.
- Since the previous problem is at higher priority we need to resolve it first.

# Summary

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- Using short PD MPS pulse duration  $<75\text{ms}$  requires careful analysis.
- At 10msec MPS, the detected signal in the PSE is much weaker and distorted.
  - It gets worse with some noise around
  - It gets even worse with  $C_{pd} > 180\mu\text{F}$ .
  - It required more gates to get the required resolution.
- We need PSE/PD vendors to address it and check if 5msec under mentioned conditions is cost effective detectable.

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# Thank You

# Discussion

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