

Reducing MPS duty cycle

For lower standby power

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PHILIPS

Problem statement

- Deploying large numbers of PDs leads to unacceptably large standby power
- Standby power of a **powered** PD is lower bound for Type 1 & 2 to $75\text{ms}/325\text{ms} * 10\text{mA} * 57\text{V} = \mathbf{132\text{mW}}$
- With Energy Efficient Ethernet (and careful design of the rest of the system) we can design PDs that would keep power & link for $\leq 100\text{mW}$
- This means a current (at 57V) of 1.75mA, however MPS requires us to burn an additional $75\text{ms}/325\text{ms} * (10\text{mA} - 1.75\text{mA}) * 57\text{V} = \mathbf{108\text{mW}}$ bringing the minimum realistic total to **208mW**.
- For a 72000m² office building this difference results in 2.5KW extra with lights off -> 17.9MWh = 1800 euro/year.

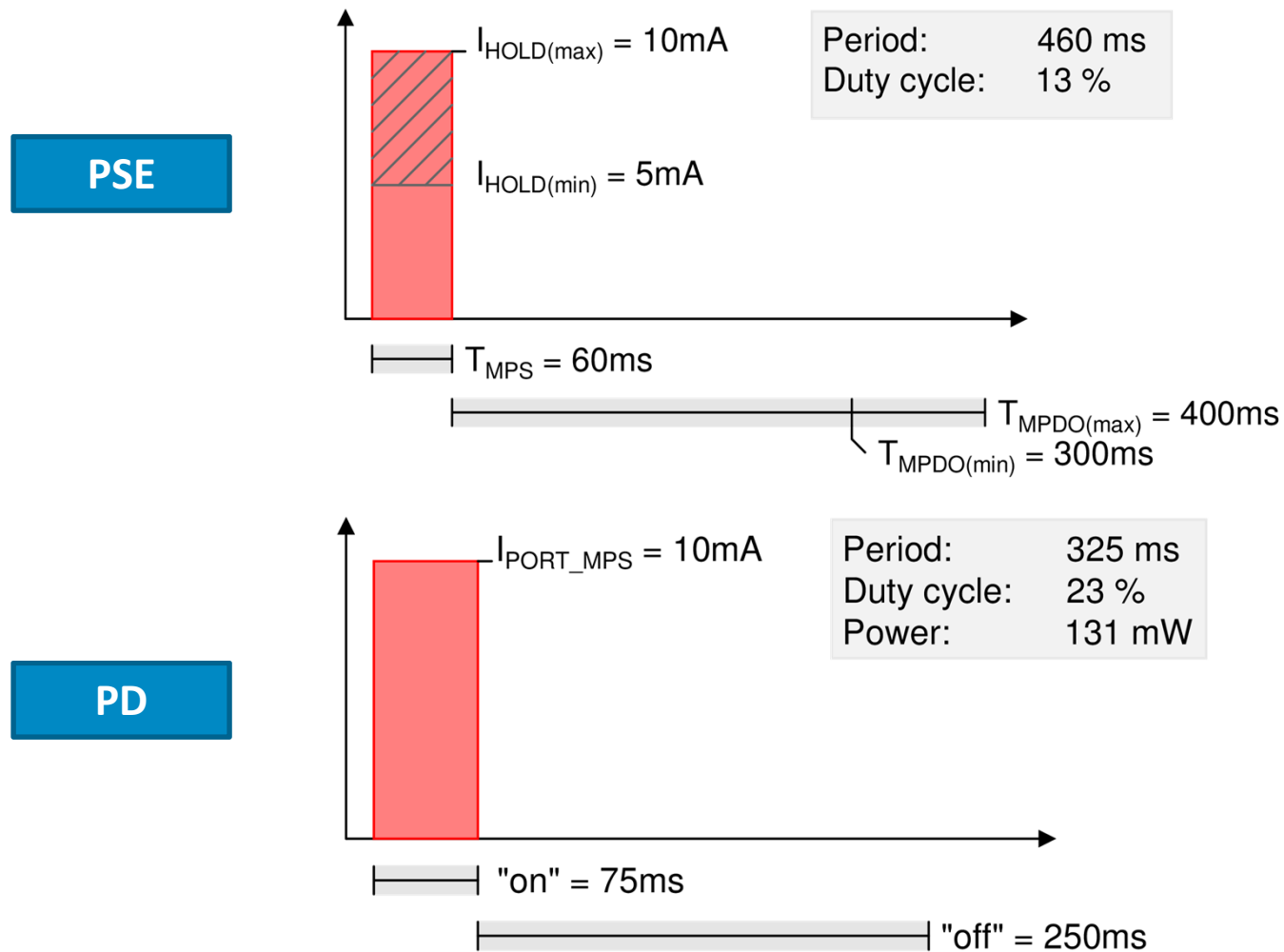
Proposal

- Change as little as possible → reduce the duty cycle of the MPS
- Keep $T_{MDPO(MAX)}$ the same as this relates to safety.

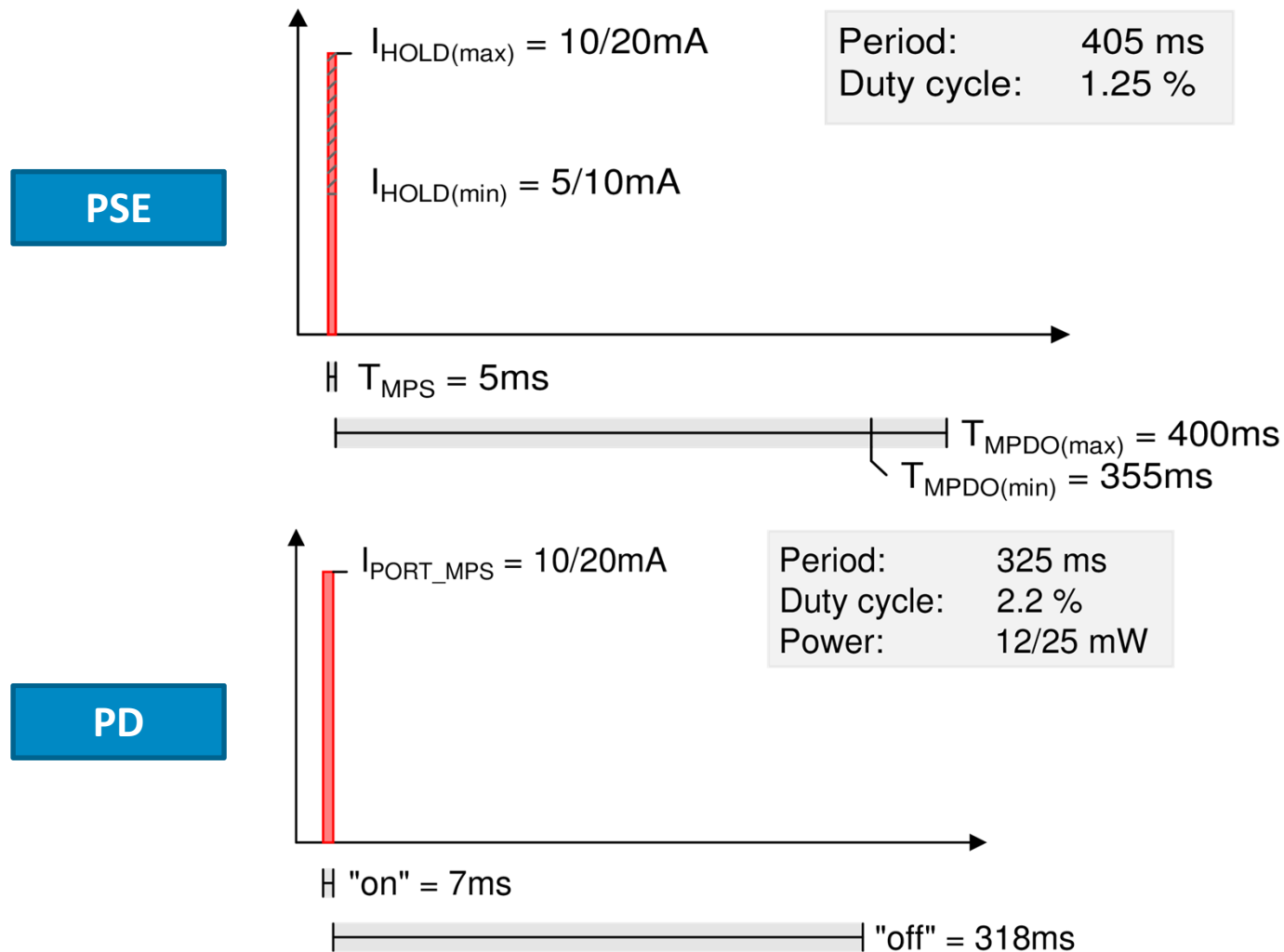
Parameter	Type 1 & 2 (.3at)		Type 3 (proposed)	
	PSE	PD	PSE	PD
$I_{HOLD(MAX)}$	10mA		10mA/20mA	
I_{PORT_MPS}		10mA		10mA/20mA
T_{MPS}	60ms	(75ms)	5ms	(7ms)
$T_{MPDO(MIN)}$	300ms	(250ms)	355ms	(318ms)
$T_{MPDO(MAX)}$	400ms		400ms	

- Duty cycle drops to 2.15% (PD), power 12mW or 25mW (depending on PSE count)

IEEE 802.3af & .3at MPS PSE & PD rules



Proposed new MPS scheme



Compatibility with Type 1 & 2

	Type 1,2 PD	Type 3 PD
Type 1,2 PSE	Does not apply	Use Type 1,2 timing, PD must have identified PSE as Type 1 or 2
Type 3 PSE	PD will use Type 1,2 timing, PSE can use either timing scheme	Use Type 3 timing if PD identifies PSE as Type 3

Problems to solve

- Short MPS pulse gets filtered by PD bulk capacitor combined with cable impedance.
Status: confirmed with spice simulation
- Short MPS pulse can be cancelled out by interference from eg. Mains cable.
Status: experiment confirms that mains cable can induce 10mA current in UTP cable over 30 meter. Duration is very short.
- Cable imbalance requires higher MPS current
Status: confirmed, requires extra margin in MPS current in 2 power channel implementation

