



POEP Power Management

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Power Management Gaps

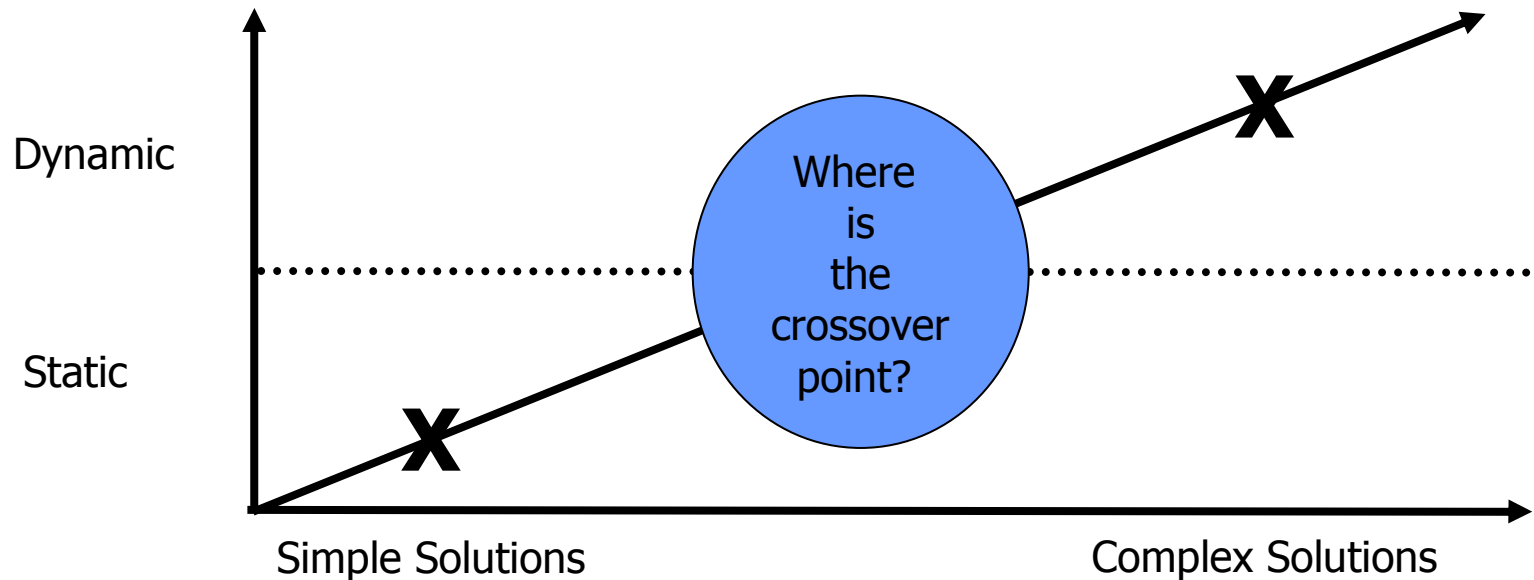
- Allocation requires a 'realistic' power prediction from PDs
 - Switch can allocate power on this basis, however ...
 - PD's have little motivation to minimize their power requests
 - Only mechanism that limits PD power to $< P_{max}^{**}$ is the possibility of dropped power supply
 - Classic 'tragedy of the commons' situation
- Real power supply utilization is limited by this

**Maximum .3at power – 50W / 100W

Peak Power vs. Average Power

- Applications have different real power requirements
 - Multiple-radios WLAN AP average power is non-deterministic
 - PTZ camera average power is not deterministic
 - PTZ functions have higher power requirement and can happen at any time
 - Simultaneous PTZ functions on all cameras during testing – PSE must deliver peak power on all ports
- PD's have limited capability to predict power needs
 - IC max power can be 1.5X to 2X times higher than typical power
 - $I_{DD(DIG)} = k_0 C V_{DD}^2 f$, $I_{DD(ANA)}$ includes matching & PVT variations
 - PDs may enter low power modes for long periods of time
 - PD power can vary by as much as 1:4 or more

Static vs. Dynamic Power Management

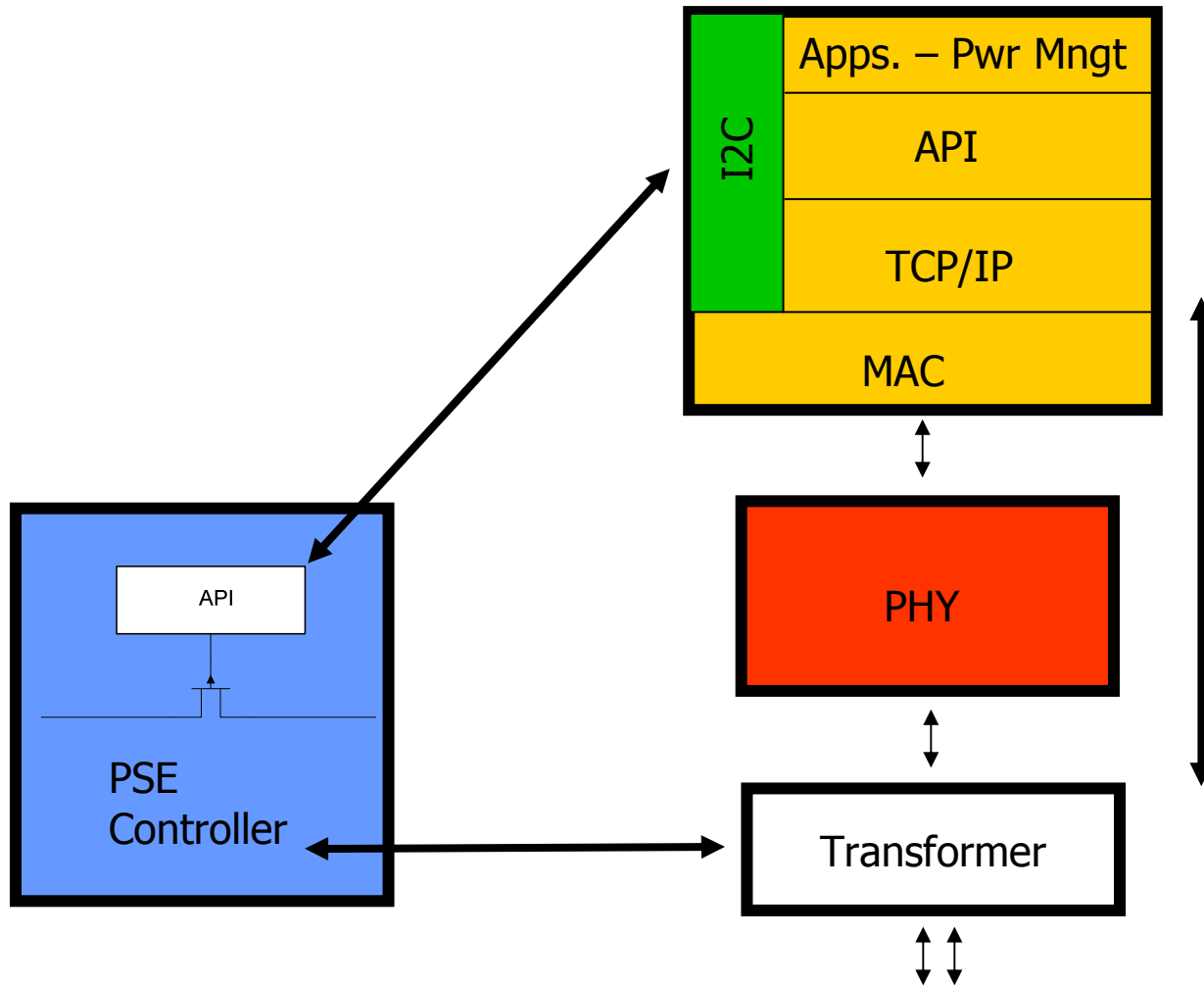


- High PS utilization requires dynamic power management
- Dynamic power management needs to be addressed at a higher layer
 - It should be addressed in 802.3at

Power Management at Higher Layers

- Minimal overhead for direct L1+ pwr mgmt in PSE controller
 - At PSE controller, this can be simple register IO to set current limits
 - L1+ protocol only needed for exchange of PD needs & PSE capabilities
- Advantages of L1+ power management
 - Higher PS utilization – get closer to $N \times P_{AVG}$
 - Can address time-varying power limits
 - Can mix statistical methods with PD peaking requests

Power Management at Higher Layers



Conclusion and Recommendations

- PD's have limited capability to predict power needs
- Minimal PSE controller overhead for L1+ power management
- Recommendation
 - Power Management adhoc to examine L1+ dynamic power management