

PHY Feasibility: The Impact of Signaling on Power and Area

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Claude Gauthier, OmniPHY



PHY Technical Feasibility

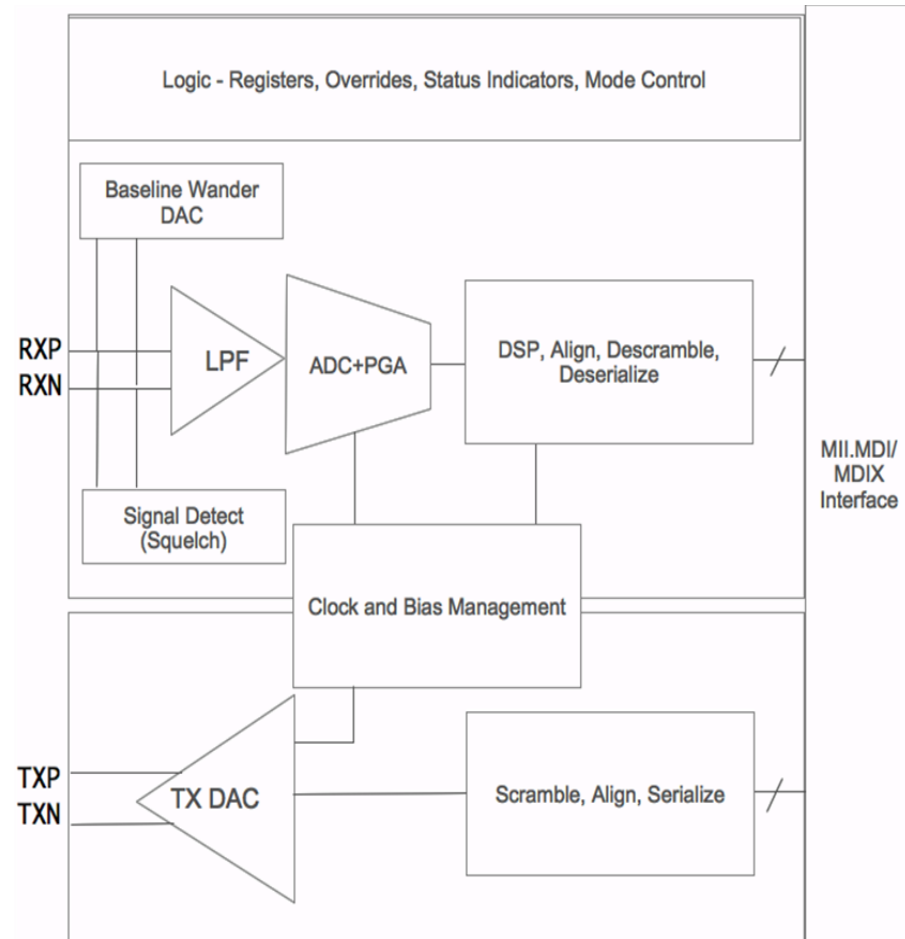
- A 50% cost-reduction relative to 100Base-T1
 - Silicon
 - Package
 - Test
 - Cabling/Connectors
- Initially, there was skepticism about the silicon reduction at the PHY level, we sought to investigate

PHY Technical Feasibility

- In this presentation we consider silicon to establish a boundary condition as to low cost solution for 15/40m reach constrained to a 100Base-T1-like channel in a point-point configuration
 - Signaling-scheme, area, power
- We conclude/confirm that <50% power/area reduction is technically feasible, and with optimization greater gains are possible
- Next steps – converge on a channel
 - Establish margin, noise immunity, EMC

PHY Technical Feasibility

- First considered 100BT v 10BT
- 100BT
 - MLT3 coded signaling, +1,0,-1V
 - 4B/5B encoding
- 10BT
 - Differential voltage, +/-2.5V
 - Manchester encoding to guarantee transitions
 - 10BT silicon area << 0.5x
 - 10BT power dissipation actually higher in many implementations
- Nominally, 100BT1 is 3x the size of 100BT



PHY Technical Feasibility

- We evaluated 2 signaling implementations and found the automotive technical feasibility could be satisfied
 - Constrained the channel to 802.3bw, for now
- NRZ or DME
 - Class AB transmitter, simple comparators for receive
 - Area < ~25-30% of 100BT1 area
 - Power Dissipation < 20% of 100BT1
 - Power reduction supports reduction of package pins
 - Metal-stack and/or process selection can drive further wafer cost reductions
 - Digital synthesis is done to support very low speeds
- This has the potential to be very inexpensive, but the full automotive constraints need to be applied

PHY Technical Feasibility

- Open Questions
 - Converging on a channel
 - Establish margin, noise immunity, EMC, BER
 - If low-complexity solutions pass the requirements, we anticipate short- and long-reach to be different PHY's
- Our implementations can be used as baselines to address future considerations
 - Simulations and further feasibility

Thank-You!