



Considerations for Coding and Baud Rate of a Multi-Gig Phy for Automotive

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Key Considerations

- EMC susceptibility and emission:
 - Early Susceptibility BCI results indicate that STP cables have comparable induced differential interference as 10V/m on CAT6A used for 10GBASE-T
 - Data above 400MHz is being collected now
 - There is potential to use the well-understood techniques for interference cancellation from 10GBASE-T
 - For EMI emission, it is also desirable to keep the transmission bandwidth low (e.g. < 3GHz)
- Echo channel:
 - While there is still limited data on RL, the loss is generally reduced at higher frequencies which could create some challenges for the PHY

PHY Complexity Considerations

- The lower the bandwidth, the lower the frequency of the operation of the PHY including analog and digital processing
 - Easier equalization (e.g. PAM4 vs. PAM2: 8dB lower loss at Nyquist)
 - Shorter echo-cancellation filters (e.g. PAM4 vs. PAM2: 2X fewer taps , 4X fewer operation per second)
 - Lower power consumption in digital
 - Less error due to clock jitter
 - Clock jitter has a much tougher requirement for full-duplex channels
 - Less stringent requirements on analog front-end
 - Linearity
 - Common-mode

Preliminary Thoughts on PHY

- Our initial investigation indicates that modulation with sparse constellation (e.g. PAM2) which requires a very wide bandwidth of operation:
 - is not desirable from EMC (immunity and emission) perspective,
 - creates challenges for echo cancellation resulting in unattractive trade-offs with cost in chip complexity and power
- It is desirable to have a system with less than 3 GHz of operational bandwidth with PAM4 or denser modulation schemes
- More in-depth analysis and strawman proposal to come in the next sessions

Thank you.

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