

Type B link Segment Proposal and a New PHY Specification for Longer Range Industrial Applications

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Foreword

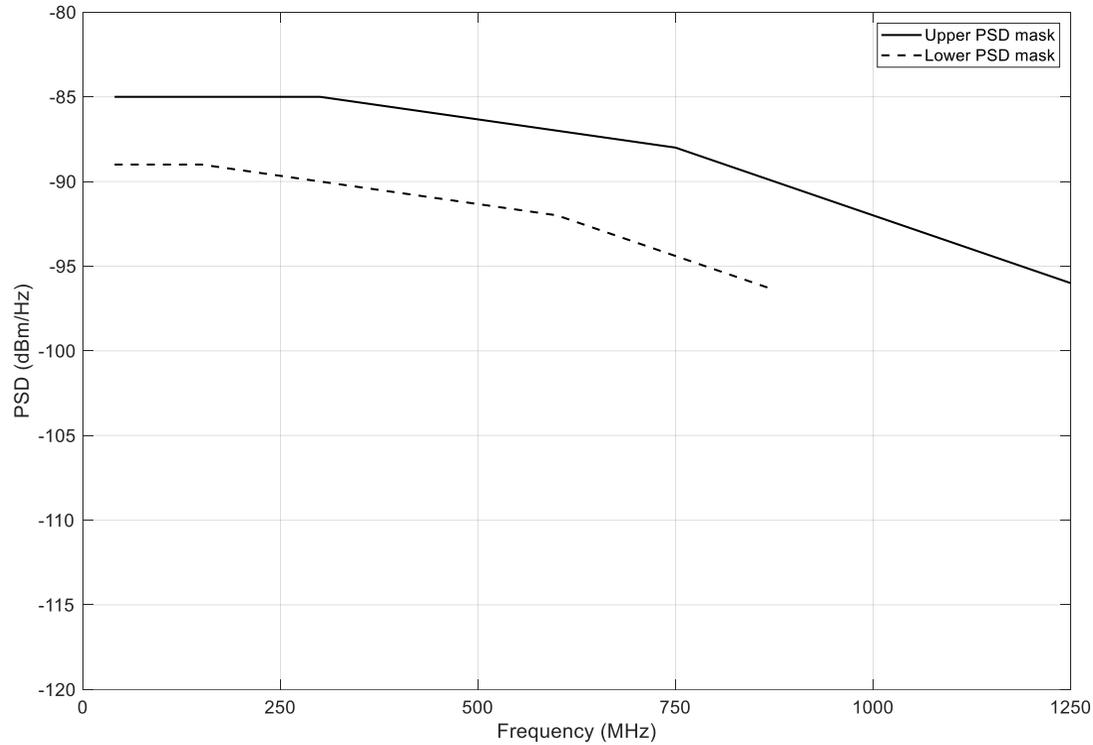
- TDD based 802.3dm in clause 202 specifies PHY with multiple speeds, mainly for automotive applications for up to 30m cable length.
- There is an opportunity within boundaries of 802.3dm to add an asymmetric PHY for industrial applications with up to 100m cable reach.
- Type B link segment is specified STP or a Coaxial cable with an insertion loss limit of 24dB at 750MHz.
- A new TDD based PHY is specified to support 1Gbps in one direction and 100Mbps in the reverse direction over a type B link segment with up to 100m reach.

1Gbps+100M, Up to 100m*

TDD Cycle	9.6us
HS and LS FEC Type	S=8bit Reed-Solomon Code RS(132S, 122S), L=1 for 1.0Gbps (120Byte at XGMII, 15 x 65b+1b OAM)
Number of FEC codes in HS path	10
Number of FEC codes in LS path	1
IBG (Inter Burst Gap) normal mode transmit gap	2 x 520ns per TDD cycle
Total Refresh (Resync) Sequence per TDD cycle	816ns = 1224 symbols
Modulation and Baud Rates	PAM2, 1.5Gsps
IL at Nyquist (750MHz)	24dB (Type B)

- * The max range depends on cable IL. Longer than 50m with RTK031. Ticker Coax cables available for longer ranges.
- Possible to add more OAM if required.
- Larger IL possible but adds to receiver complexity.

PSD MASK and Power Limits



Power Min=1dBm, Max= 4dBm for STP
Power Min=-2dBm, Max= 1dBm for Coax
S=0.25
K= - 4

Plot shows PSD for STP cables, Coaxial limits are 3dB lower.

Power over Cable

- Given the high baud rate in the both directions, 1uH inductors may still be used for power coupling.
- Small inductance requirement for the proposed protocol, allows for large power sourcing along with data communication.
- For example, with 48V, 2A PSE, **96W power** can be sourced with high power efficiency (small inductance allows for low DCR). The delivered power depends on the cable DCR.

Proposal

- Add a Type B link segment spec with up to 24dB insertion loss at 750MHz to support industrial applications.
- Add the proposed TDD based PHY specification with 1Gbps in one direction and 100Mbps in the reverse direction to operate over Type B link segment with up to 100m cable reach.

Thank you
Questions?