
802.3CG PMA ELECTRICAL AND LINK SEGMENT DEFINITION ... CHECKED

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802.CG



802.3cg Short-Reach PHY

PMA Electrical and Link Segment Definition

- Baseline for short reach link segment (as of motion #14 in Charlotte Sep 2017):

Insertion Loss:	IL <	$1 + 1.6 (f-1)/9$ dB	f=0.3.... 10MHz
		$2.6 + 2.3 (f-10)/23$ dB	f=10 33MHz
		$4.9 + 2.3 (f-33)/33$ dB	f=3340MHz
Return Loss:	RL >	14 dB	f=0.3...10MHz
		$14 - 10 * \text{LOG}_{10}(f/10)$ dB	f=10...40MHz
Mode Conversion:	MC >	30 dB	f=0.3...20MHz
		$30 - 20 * \text{LOG}_{10}(f/20)$ dB	f=20...200MHz

- Progression of proposed values from 802.3bw → 802.3cg

- TX-Amp: 2.2V → 1V (or -6.85dB)
- Mode Conversion Limit: (-)43dB → (-)30dB

- TX power is generated at lower baud rate
→ spectral power at lower frequencies will get higher
(by about 5dB going from 33MHz to 8MHz)

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- Transmit spectrum at 1Vpp differential (pos/neg levels +/-500mV)
 - evenly distributed (first excel approximation) in 8MHz BW:
PSD is at -65dBm/Hz (this matches proposed PSD-TX-mask in http://www.ieee802.org/3/cg/public/Nov2017/beruto_3cg_02a_117.pdf slide 7)
 - this is equivalent to ca. 84dB μ V/10kHz
 - again MC=-30dB, gives 54dB μ V/10kHz or 66dB μ V/120kHz
- Evolution of emission limits (Number of electronic components goes up; electrical drives, sensors for auton. drive, car-2-car ...)
 - closer to 35dB μ V/120kHz at 1MHz and 15dB μ V/120kHz at 50MHz
- BCI: Severity Class IV (30dBm for 3-200MHz)
 - with 30dB MC: 316mV differential peak-amplitude on TP
 - DME might help here, but how much, is unclear ...

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- Multi-Drop Link Segment
 - will have higher return loss, see measurements in http://www.ieee802.org/3/cg/public/Sept2017/kaindl_matheus_3cg_01c_09_2017.pdf (slide 14-16)
 - impact on signal integrity
 - should keep IL limit
 - expect mode conversion to „not be better“ than p2p definition (?)
- Task force direction so far
 - 10Base-T1S is a single PHY; p2p and multi-drop only differ in the supported link length (?!)

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Conclusion

- Putting current baseline proposals for 10Base-T1S together:
 - Point-2-Point: there is zero (in fact negative) margin between emissions and ingress with current link segment definition + transmitter bandwidth
 - Multi-Drop Link Segment
 - will put more strain on signal integrity, therefore reduce margin
- a baseline proposal for PMA electrical is premature and should be postponed after balancing out all requirements considered here
- baseline for p2p link segment should be revisited
(in the direction of:
- | | |
|----------------------------------|-------------|
| $MC < -43$ | 0.3..12MHz |
| $< -43+20*\text{LOG}_{10}(f/12)$ | 12..200MHz) |

Thank you for your attention!