

Baseline Proposal for
100GAUI-1/200GAUI-2/400GAUI-4 C2M
Reference Receiver

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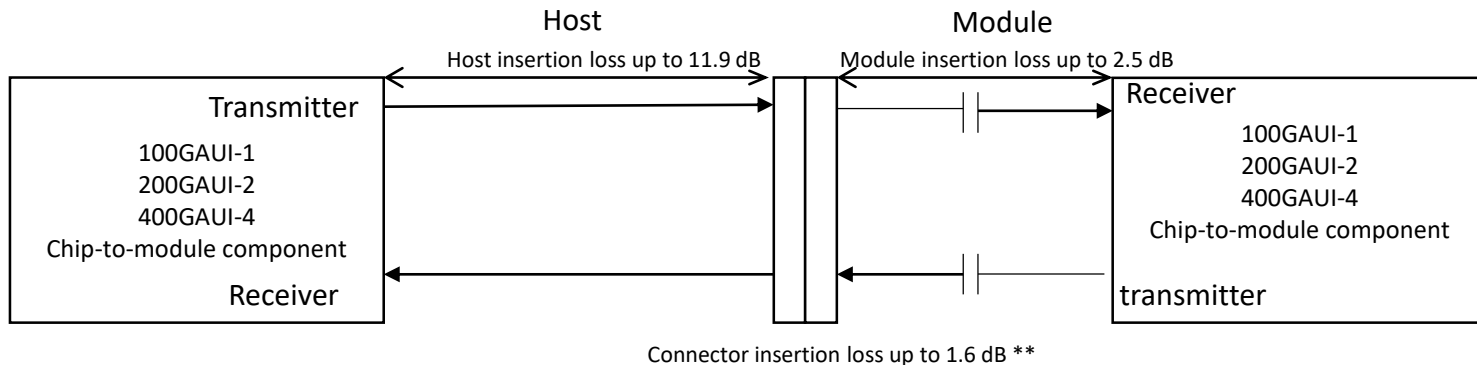
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Introduction

- ❖ This baseline proposal is to complete open items of the adopted C2M baseline [sun 3ck 04b 0319](#), including the following items:
 - ❖ Channel loss allocation
 - ❖ Reference receiver and its optimization algorithm
 - ❖ EH, ESMW, and VEC thresholds
 - ❖ HCB/MCB characteristics
 - ❖ Return loss (ERL) parameters for host/module input and output

Channel Insertion Loss Allocation

- ❖ C2M channel and insertion loss allocation:



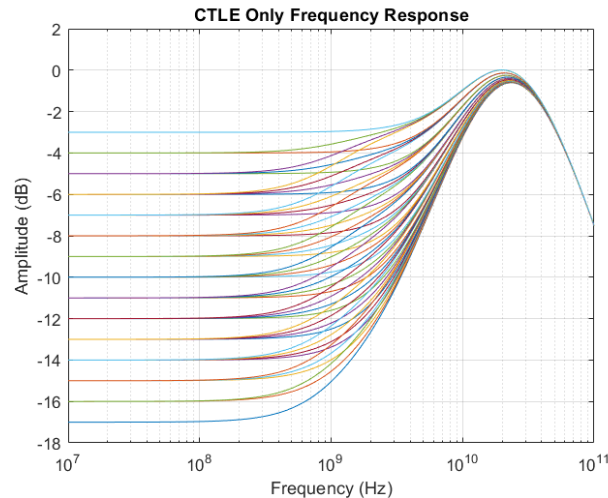
** The host connector mating interface is allocated 0.3 dB variation allowance, not including via.

Reference Receiver

- ❖ Reference receiver for both host and module output is CTLE + a 4-tap DFE with
 - $b_{\max}(1)$ limited to 0.5 or lower, and
 - $b_{\max}(2,3,4)$ limited to 0.2.

* Parameters in magenta throughout this presentation need to be confirmed.

CTLE and Noise Filter



| CTLE | | |
|------------------|------------|-----|
| g _{DC} | [-14:1:-3] | dB |
| f _z | 12.58 | GHz |
| f _{p1} | 20 | GHz |
| f _{p2} | 28 | GHz |
| g _{DC2} | [-3:1:0] | dB |
| f _{LF} | fb/40 | GHz |

- CTLE equation is the same as in Clause 93A:

$$H_{ctf}(f) = \frac{\left(10^{\frac{g_{DC}}{20}} + j\frac{f}{f_z}\right)\left(10^{\frac{g_{DC2}}{20}} + j\frac{f}{f_{LF}}\right)}{\left(1 + j\frac{f}{f_{p1}}\right)\left(1 + j\frac{f}{f_{p2}}\right)\left(1 + j\frac{f}{f_{LF}}\right)}$$

- An additional noise filter is a fourth-order Butter Worth filter with 3dB bandwidth fr=39.8438 GHz:

$$H_r(f) = \frac{1}{1 - 3.414214(f/f_r)^2 + (f/f_r)^4 + j2.613126(f/f_r - (f/f_r)^3)}$$

- * CTLE is the same as in [sun 3ck 03 0319](#).

Reference Receiver Adaptation Methodology

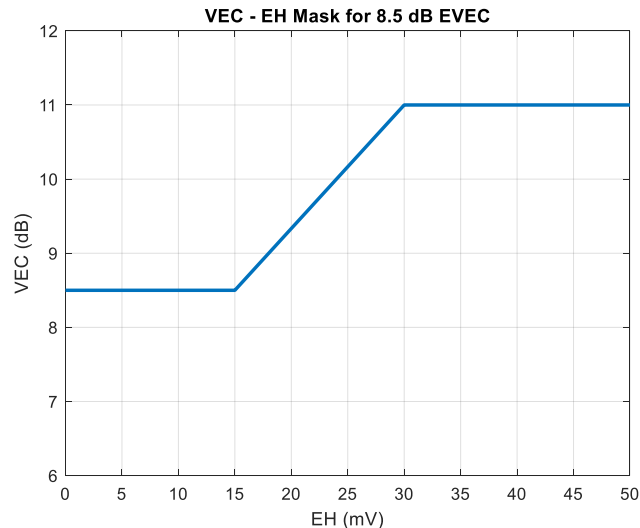
- ❖ Reference equalizer adaptation algorithm is **explicitly specified to achieve measurement consistency**.
 - Leverage Clause 85.8.3.3.5 linear fit methodology to extract pulse response. Parameter M is no less than 32, Dp is 3, and Np is 200.
 - Leverage Annex 93A for optimal phase and DFE tap weight.
 - Apply phase and DFE weight on measured waveforms. Noise and distortion are all kept. Reuse Annex 120E for test point measurement.

Host Output Characteristics (at TP1a)

| Parameter | 400GAUI-8 | 100GAUI-1, 200GAUI-2, 400GAUI-4 |
|--------------------------------|-----------|--|
| ESMW (Eye symmetry mask width) | 0.22 UI | TBD |
| Eye height, differential (min) | 32 mV | 15 mV |
| Vertical Eye Closure (max) | 12 dB | 8.5 dB EVEC (Effective Vertical Eye Closure) |

EVEC definition:

$$EVEC = \begin{cases} VEC, & \text{if } EH < 15 \text{ mV} \\ VEC - 0.1667 * (EH - 15) \text{ dB}, & \text{if } EH \text{ is between } 15 \text{ and } 30 \text{ mV} \\ VEC - 2.5 \text{ dB}, & \text{if } EH > 30 \text{ mV} \end{cases}$$

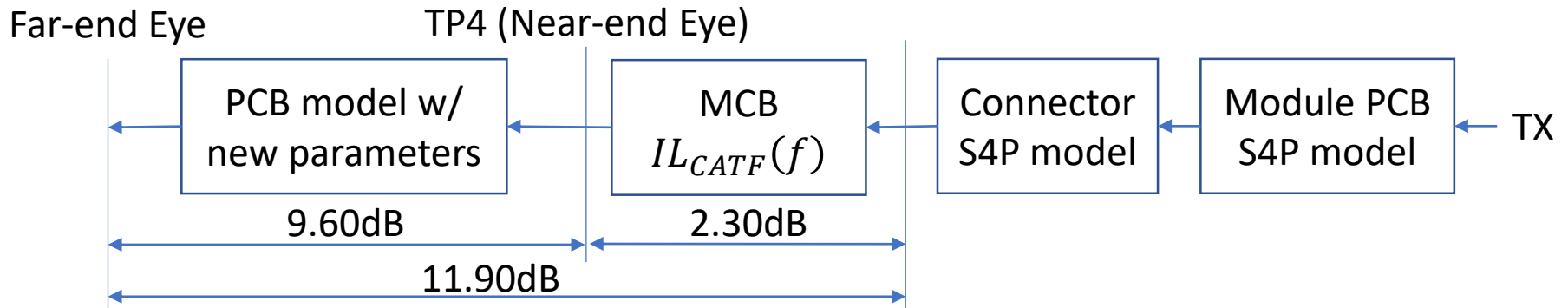


Module Output Characteristics (at TP4)

| Parameter | 400GAUI-8 | 100GAUI-1, 200GAUI-2, 400GAUI-4 |
|---|-----------|---------------------------------|
| Near-end Vertical Eye Closure (max) | - | 6.5 dB |
| Near-end Eye height, differential (min) | 70 mV | 50 mV |
| Near-end ESMW (Eye symmetry mask width) | 0.265 UI | TBD |
| Far-end Vertical Eye Closure (max) | - | 7 dB |
| Far-end Eye height, differential (min) | 30 mV | 20 mV |
| Far-end ESMW (Eye symmetry mask width) | 0.2 UI | TBD |

Module Output Far-End Reference Channel model

- Host IL (11.9dB) – MCB IL (2.3dB) = PCB model IL budget (9.6dB)
 - 243.84mm PCB model has 9.60dB at 26.56GHz using Table 92-12 parameters shown in config_example_ieee8023_93a=3ck_CR_mellitz_01_100219
 - $\gamma_0 = 0$, $a_1 = 3.8206 \times 10^{-4}$, $a_2 = 9.5909 \times 10^{-5}$, $\tau = 5.790 \times 10^{-3}$



HCN/NCN Characteristics

- HCN characteristics are described in 162B.1.1 where the HCN performs the same equivalent function as the TP2 or TP3 test fixture.
- NCN characteristics are described in 162B.1.2 where the NCN performs the equivalent functionality as the cable assembly test fixture.
- The mated compliance board characteristics are described in 162B.1.3 where the NCN and HCN perform the equivalent functionality as the cable assembly test fixtures.

Host/Module Input / Output Effective Return Loss

| Parameter | 50GBASE-CR, 100GBASE-CR2, 200GBASE-CR4 | 100GAUI-1, 200GAUI-2, 400GAUI-4 Host | 100GAUI-1, 200GAUI-2, 400GAUI-4 Module |
|--|--|---|---|
| Transition time associated with a pulse (T_r) | 0.0189 ns | 0.010 ns | 0.010 ns |
| Incremental available signal loss factor (β_x) | 1.7 GHz | 2.4 GHz | 2.4 GHz |
| Permitted reflection from a transmission line external to the device under test (ρ_x) | 0.3 | 0.3 | 0.3 |
| Length of the reflection signal (N) | 300 UI | 600 UI | 600 UI |
| Transmitter steady-state voltage, v_f (min.) | 0.354 V | 0.39 V | 0.41 V |
| Transmitter steady-state voltage, v_f (max.) | 0.6 V | 0.6 V | 0.6 V |
| Linear fit pulse peak (min.) (P_{max}) | $0.49 \times v_f$ V | $0.28 \times v_f$ V | $0.59 \times v_f$ V |
| Transmitter (Host/Module output) ERL_{min} | EQ 136-6 at TP2 | See Equation below, at TP1a | ≥ 11 dB at TP4a |
| Receiver (Host/Module input) ERL_{min} | ≥ 10 dB at TP3 | ≥ 11 dB at TP4a | ≥ 11 dB at TP4a |
| Equalizer length associated with reflection signal (N_{bx}) | - | 4 | 4 |

- See 93A.5 for definition of parameters
- $N_p = 200$ for fitting. v_f is defined in 93.8.1.5.2 , i.e. 200 UI after the sample point is used for v_f

- Host output ERL_{min} equation:

$$if \frac{\text{Linear fit pulse peak}}{v} \geq 0.375 ERL_{min} = 11 (dB)$$

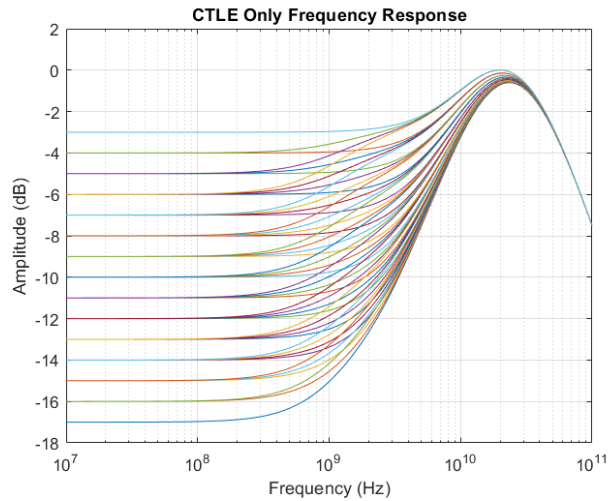
$$else ERL_{min} = 14 dB$$

Summary

- ❖ Propose 802.3ck task force to adopt these baseline proposals on slides 5-13, with a note that VEC, EH, ERL thresholds need to be further confirmed.

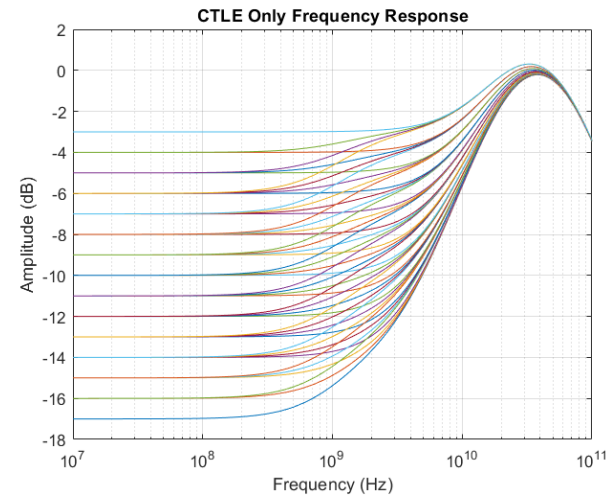
Backup Slides

CTLE



| CTLE and Noise Filter for Receivers A, A2, and B | | |
|--|------------|-----|
| g_{DC} | [-14:1:-3] | dB |
| f_z | 12.58 | GHz |
| f_{p1} | 20 | GHz |
| f_{p2} | 28 | GHz |
| g_{DC2} | [-3:1:0] | dB |
| f_{LF} | 1.328125 | GHz |

CTLE for $b_{max}(1) > 0$



| CTLE and Noise Filter for Receivers C and D | | |
|---|------------|-----|
| g_{DC} | [-14:1:-3] | dB |
| f_z | 18.88 | GHz |
| f_{p1} | 28 | GHz |
| f_{p2} | 53.125 | GHz |
| g_{DC2} | [-3:1:0] | dB |
| f_{LF} | 1.328125 | GHz |

CTLE for $b_{max}(1) = 0$