1.1 Integrated crosstalk noise

Given multi-disturber near-end crosstalk loss $MDNEXT_{loss}$ and multi-disturber far-end crosstalk loss $MDFEXT_{loss}$ measured over N frequencies f_n spanning 50 MHz to 10000 MHz, with uniform frequency step Δf, the RMS value of the integrated crosstalk noise σ_x shall be calculated as follows.

Define the weight at each frequency f_n using Equation (1) and Equation (2).

$$W_{nt}(f) = (A_{nt}^2 / f_b)\,\mathrm{sinc}^2(f / f_b)\left[\frac{1}{1+(f/f_{nt})^4}\right]\left[\frac{1}{1+(f/f_r)^8}\right] \quad (1)$$

$$W_{ft}(f) = (A_{ft}^2 / f_b)\,\mathrm{sinc}^2(f / f_b)\left[\frac{1}{1+(f/f_{ft})^4}\right]\left[\frac{1}{1+(f/f_r)^8}\right] \quad (2)$$

Note that −3 dB transmit filter bandwidths f_{nt} and f_{ft} are inversely proportional to the 20 to 80% rise and fall times T_{nt} and T_{ft} respectively. The constant of proportionality is 0.2365 (e.g. $T_{nt}\,f_{nt} = 0.2365$). In addition, f_r is the −3 dB reference receiver bandwidth which is set to 7.5 GHz.

The near-end integrated crosstalk noise σ_{nx} is calculated using Equation (3).

$$\sigma_{nx} = \left(2\Delta f \sum_n W_{nt}(f_n)\,10^{-MDNEXT_{loss}(f_n)/10}\right)^{1/2} \quad (3)$$

The far-end integrated crosstalk noise σ_{fx} is calculated using Equation (4).

$$\sigma_{fx} = \left(2\Delta f \sum_n W_{ft}(f_n)\,10^{-MDFEXT_{loss}(f_n)/10}\right)^{1/2} \quad (4)$$

The total integrated crosstalk noise σ_x is calculated using Equation (5).

$$\sigma_x = \sqrt{\sigma_{nx}^2 + \sigma_{fx}^2} \quad (5)$$

1.2 Cable assembly integrated crosstalk noise

The total integrated crosstalk noise for the cable assembly shall be computed using the parameters shown in Table 1.

Table 1 - Cable assembly integrated crosstalk aggressor parameters

Parameter	Symbol	Value	Units
Symbol rate	f_b	10.3125	GBd
Near-end aggressor peak differential output amplitude	A_{nt}	600	mV
Far-end aggressor peak differential output amplitude	A_{ft}	600	mV
Near-end aggressor 20 to 80% rise and fall times	T_{nt}	24	ps
Far-end aggressor 20 to 80% rise and fall times	T_{ft}	24	ps

The total integrated crosstalk noise shall be less than the value specified by Equation (5) and illustrated in Figure 1.

$$\sigma_x \le \sigma_{x,\max} = 10 \quad \text{for } 3 \le IL \le 5.3$$
$$= 12.4 - 0.45\,IL \quad \text{for } 5.3 < IL \le 17.04 \tag{5}$$

In Equation (5), the *IL* denotes the value of the cable assembly insertion loss in dB at 5.15625 GHz.

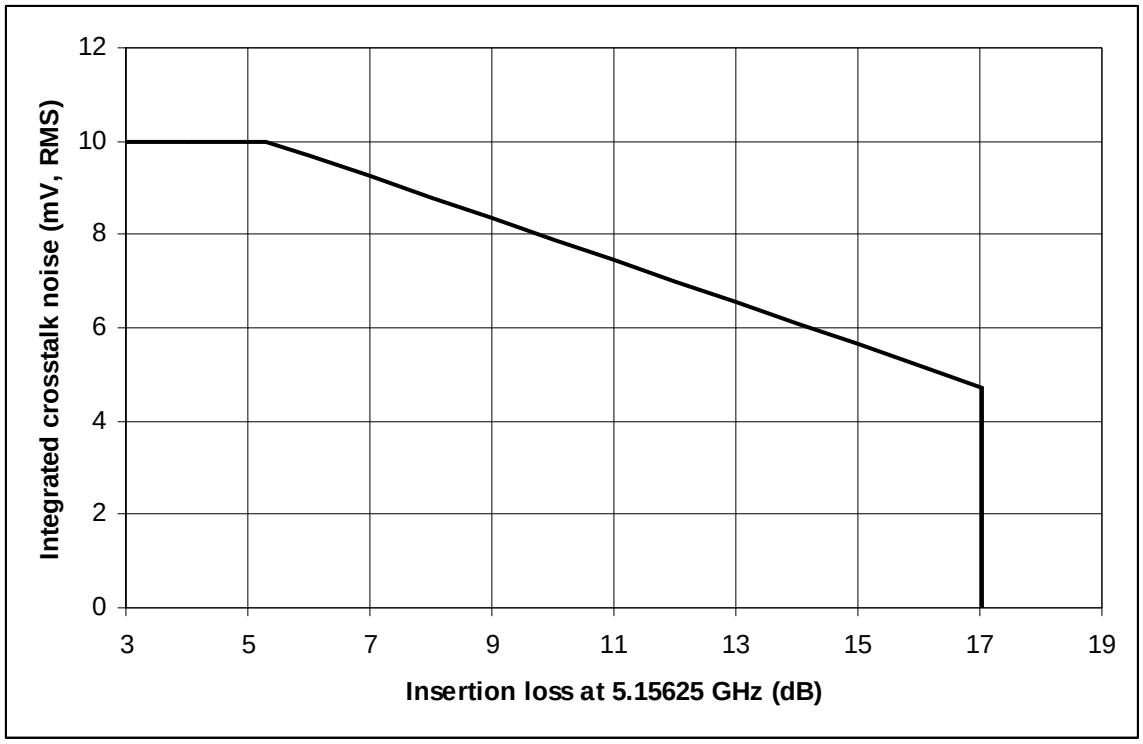

Figure 1 - Illustration integrated crosstalk noise limits

1.3 Justification for proposed requirements (NOT FOR INCLUSION IN THE DRAFT)