# Crosstalk :

Crosstalk occurs when energy is coupled from the aggressor signal to the victim signal, due to the interference of electric and magnetic fields.

Techniques for decreasing Crosstalk :

1) Increase the spacing between signal lines as much as possible. The energy in the space is reduced significantly with the distance.

2) The traces should be placed as close to ground plane as possible.

3) Implement different routing techniques wherever possible.

4) Signals should be routed in different layers.

5) Reduce parallel run lengths between signals.
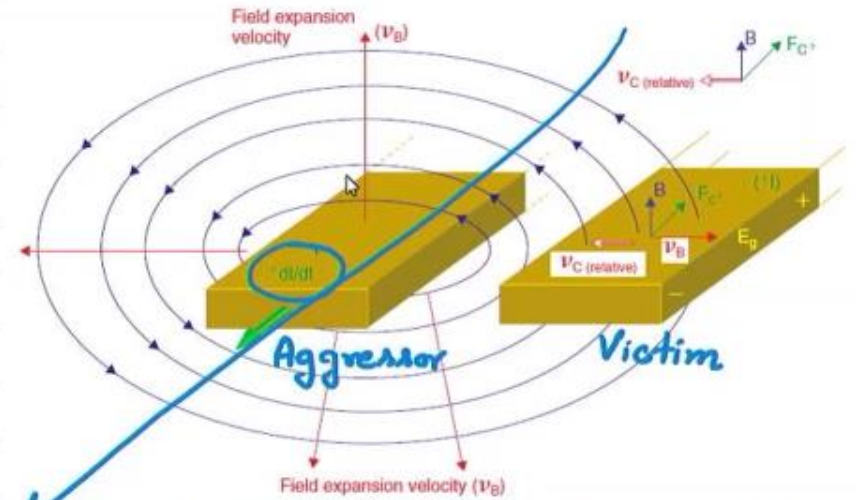
Via - Stub :

When a routed signal starts from the top layer and ends with some inner layer, the remaining portion form the ~~the~~ inner layer to the bottom layer is a via-stub.
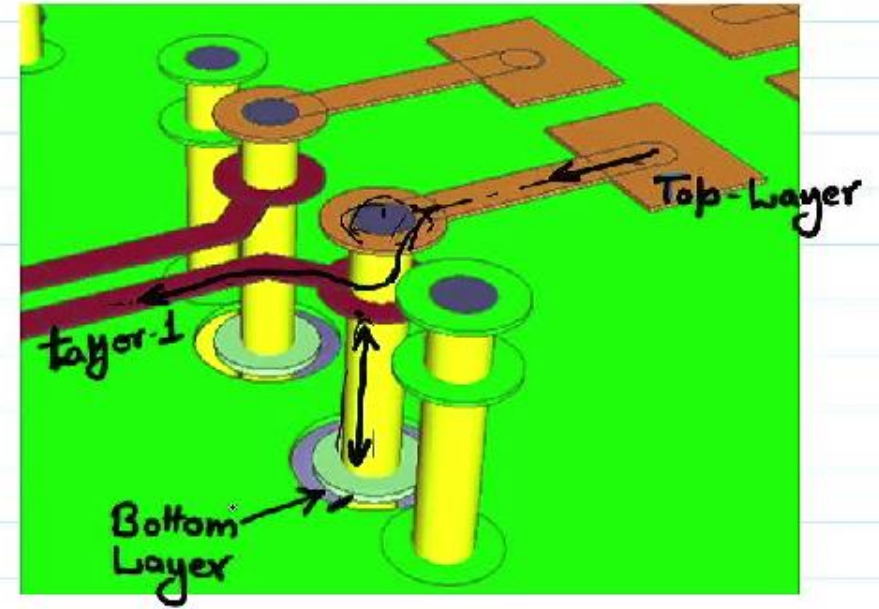
Skew and Jitter :

- Signals take finite time as they travel on a PCB from source to receiver.

- Signal delays are proportional to signal line lengths.

- If data signals and clock signals do not match in overall delays, they will arrive at different times at the receiver, this would cause signal skews.
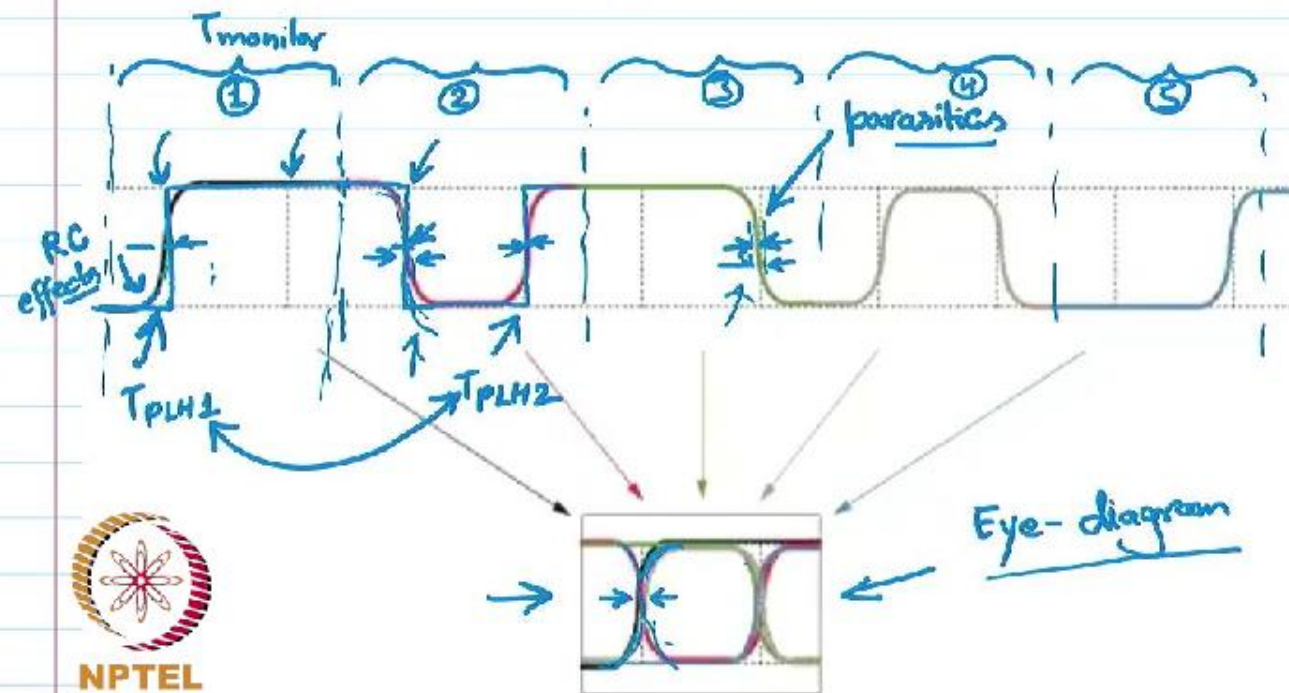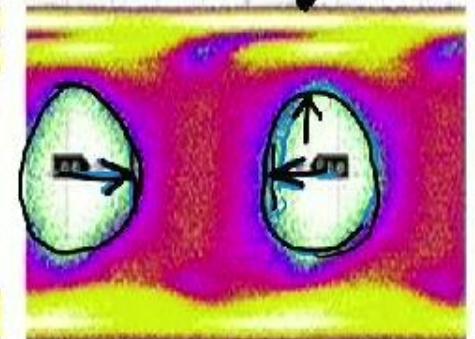
Jitter can be minimized by trace length matching.

$T_{monitor}$

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parasitics

RC effects

T_{PLH1} T_{PLH2}

Eye-diagram

Good Design
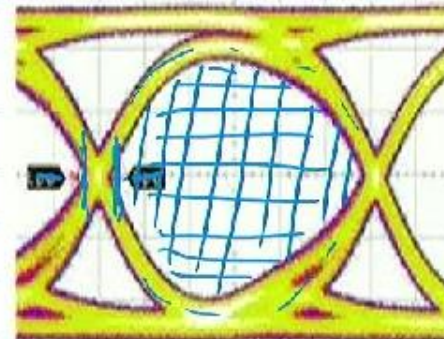
Bad Design

Signal Attenuation :

- Signals suffer attenuation as they propagate over PCB traces due to losses caused by conducting traces resistance and dielectric dissipation factor (D_f).

- Both of these losses increase as frequency increases. Therefore high frequency component of the signal will suffer higher attenuation.

" Choose the right type of PCB material for high speed design "

Signal Loss and Operating Frequency

	Loss (dB/in)		
Freq (GHz)	2	5	10
370HR	0.19	0.6	1.1
NP175	0.13	0.55	1
N4000-29	0.067	0.2	0.37
N4000-29SI	0.0046	0.12	0.25
FR408HR	0.04	0.21	0.41
Isceed	0.067	0.19	0.34
R4350	0.034	0.07	0.16
I-Tera	0.015	0.075	0.16
Meg-6	0.017	0.08	0.17
RF-35TC	0.018	0.019	0.047
R-3003	0.01	0.03	0.06
CLTE-XT	0.0095	0.04	0.047