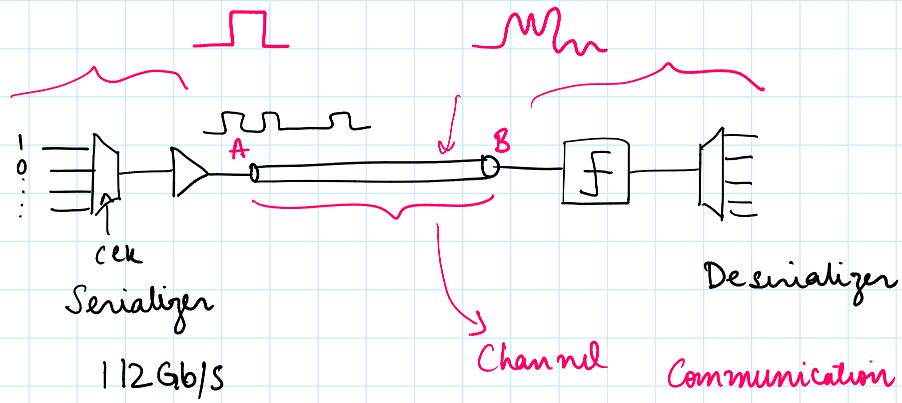
Lec-1

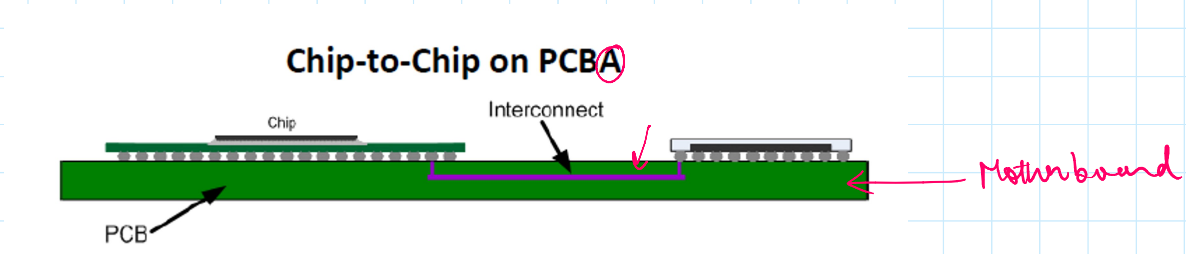
Sunday, January 5, 2020 7:58 PM



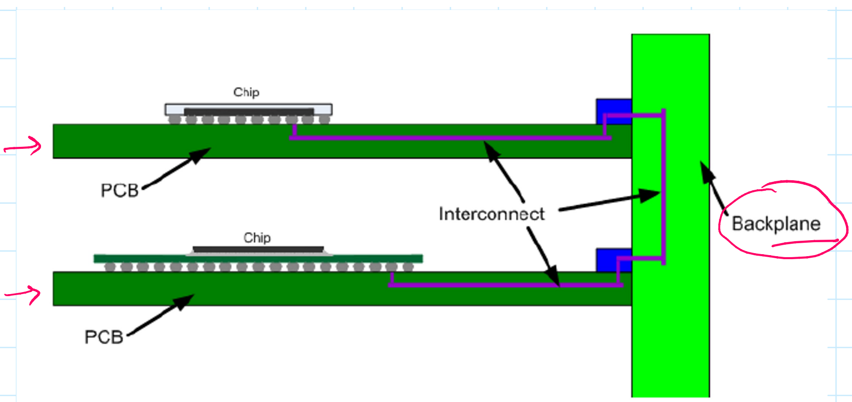
Communication channel.

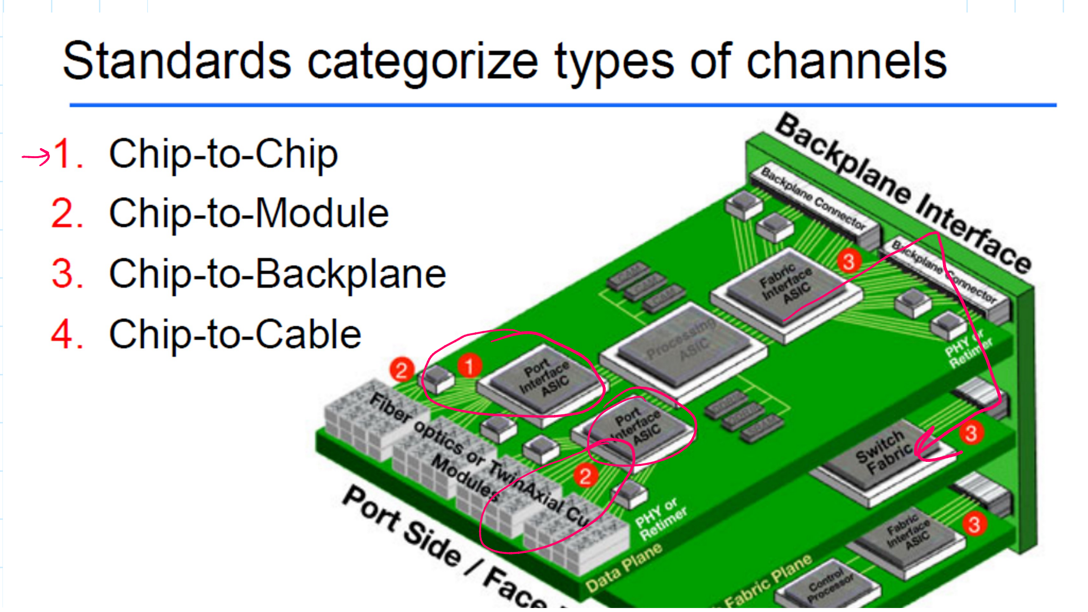
Signal Integrity : $$$

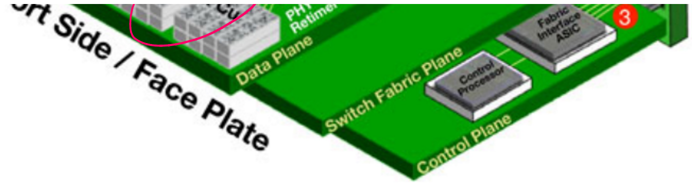
1)



2)

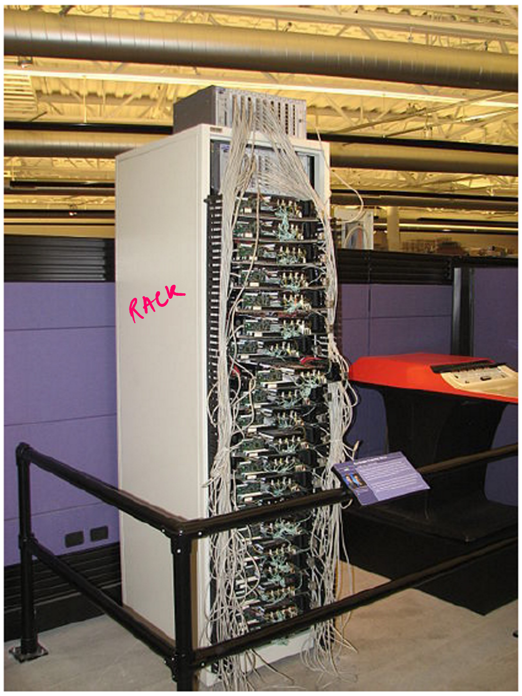




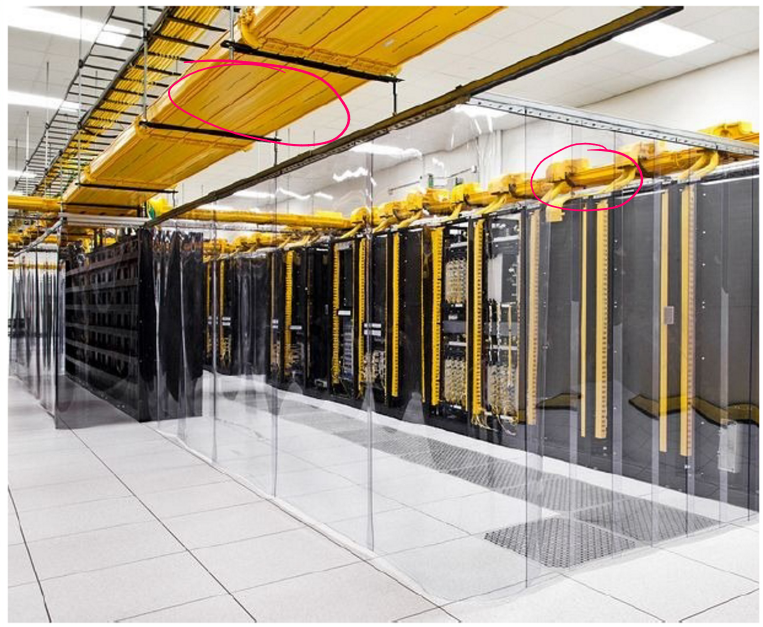


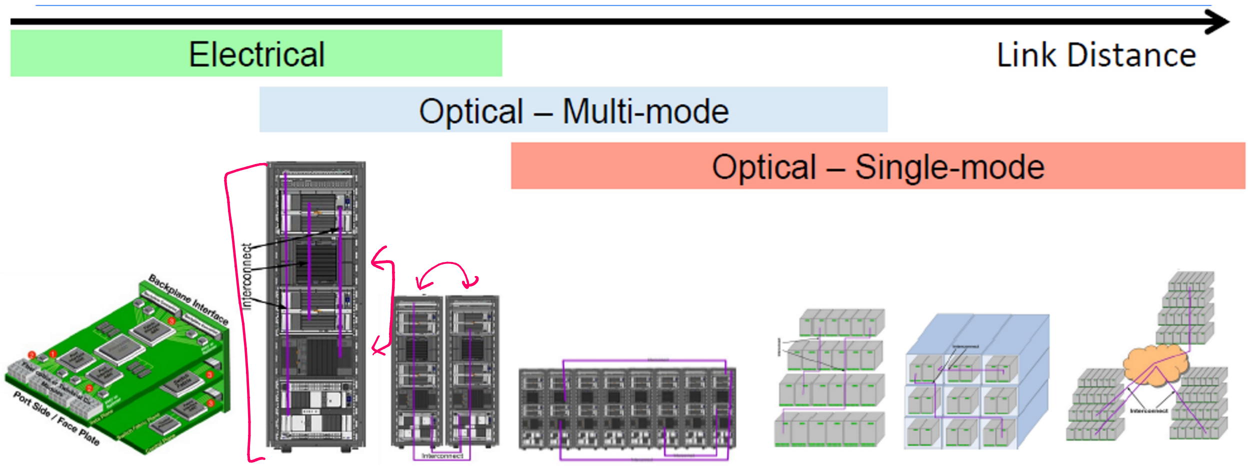
Src:https://www.synopsys.com/Company/Publications/DWTB/Pages/dwtb-data-centers-2014Q1.aspx

Google's first production server (1998)



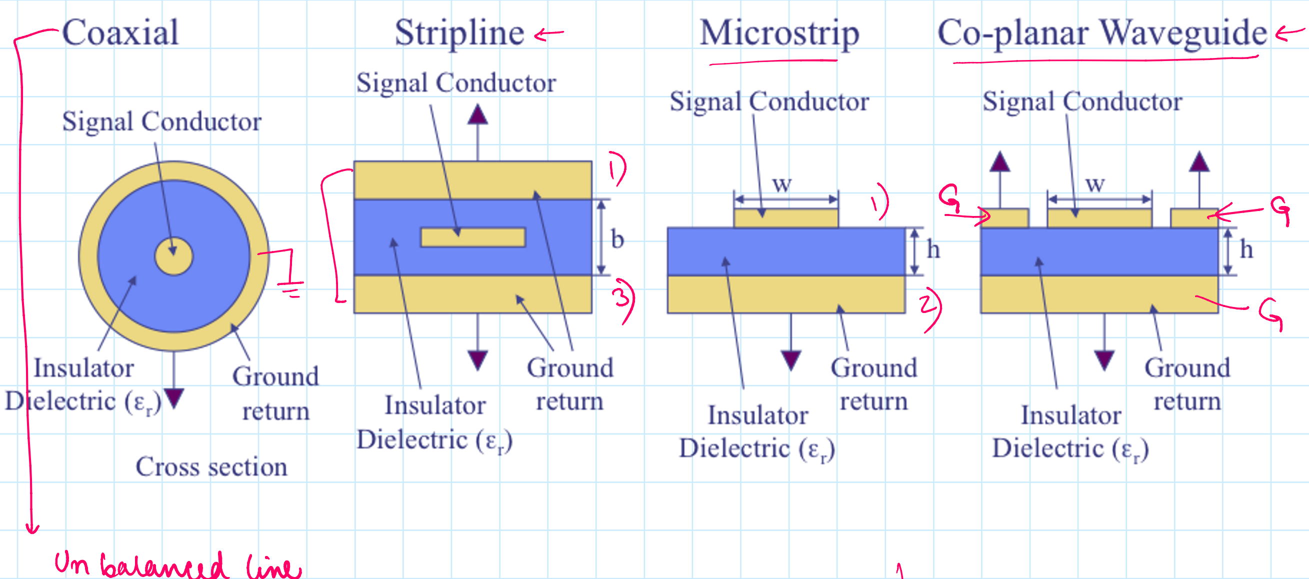
Google's Council Bluffs datacenter (2012)

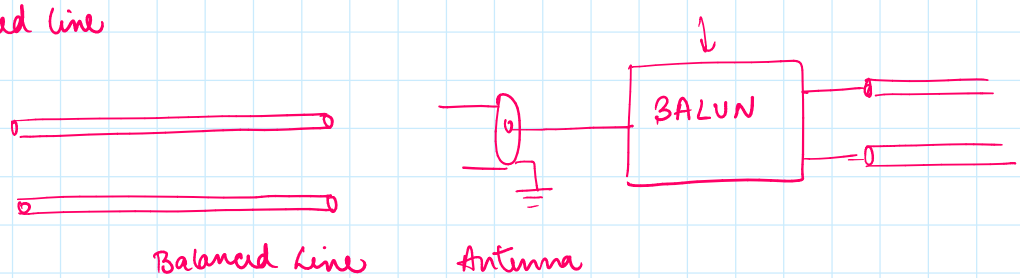




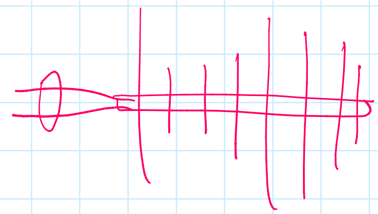
Src: http://www.oiforum.com/public/documents/OIF-FD-Client-400G-1T-01.0.pdf

Inter Interconnect Application	Distance Up To	Types of interfaces
Chassis to Chassis within a rack ←	~ 3m	Electrical or Optical
Rack to Rack side-by-side	~ 10m ←	Electrical or Optical
Rack to Rack within a row	~ 50m	Optical (MMF/SMF)
Rack to Rack within a building	~ 100-300m	Optical (MMF/SMF)
Rack to Rack within a data warehouse	~ 1,000m	Optical (SMF)
Rack to Rack within a campus	~ 2km	Optical (SMF)

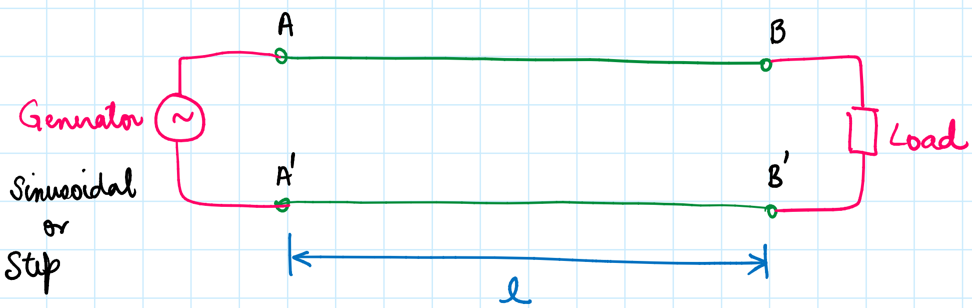


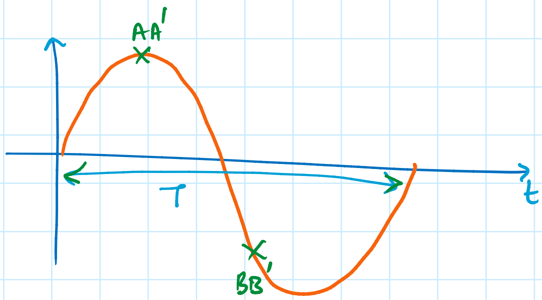


Yagi Uda Array



Transit Time Effect.





Tr = Time taken by the signal to go from point AA' to BB'

If potential at AA' is different than potential at BB' at a particular instant of time. Then we consider pair of wires as a transmission line.

$T \gg T_r$ ⟶ Ignore the Transit time effect.

$T \gg \frac{l}{v}$ (v ⟶ 30 cm/ns)

T ↑ Time period of the signal

$\frac{1}{f} \gg \frac{l}{v}$

$\lambda = \frac{v}{f} \gg l$

λ ↓ wavelength

$\lambda \gg l$ ⟶ Neglect the Transit time effect

→ ⇒ $\lambda \approx l$ → can't neglect

Observation : As freq ↑ λ ↓ → for the same communication distance, transit time effect is more prominent.

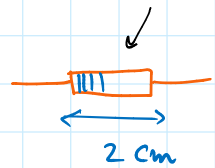
↑

Component size & wavelength.

10 GHz : $\lambda = \frac{c}{f} = \frac{30\,cm/ns}{10\,GHz} = 3\,cm$

1 GHz : $\lambda = 30\,cm$

100 MHz : $\lambda = 300\,cm$



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