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IR Drop

What's Dynamic Voltage Drop?

- It' the quick decrease in voltage rails caused by high transient current received from the power grid
- The instantaneous current drawn from the power grid during a switching event is taken into consideration with Dynamic IR drop.
- When the design team receives the simulation vectors from their functional or test pattern simulations, this analysis is frequently done at the end of the design cycle.
- This is the most time-consuming technique of analysis, but it is necessary to avoid any surprises on silicon.

Dynamic IR drop is a function of :

- Power Distribution Network (PDN):

  Weak PDN influences dynamic IR in the same way as it affects static IR . By changing standard cells, a weaker power grid is unable to satisfy the peak current demand.

- Simultaneous Switching:

  the number of standard cells switched at the same time tends to produce local hotspots with greater peak current demand, causing voltage to decrease in these areas.

How to reduce IR drop?

1-Augmenting the power grid to minimize PG resistance: Increasing the number of power/ground straps improves current distribution to the standard cells, lowering the dynamic IR drop.

2-Cell Padding: Another efficient technique to reduce dynamic IR drop is to space cells that switch at the same time apart from each other to limit peak current demand from the power grid.

This is especially useful for clock cells that show temporal switching.

3-Downsizing: Downsizing cells lowers the instantaneous current demand, however it may have a negative impact on setup time.