

Congestion Aware Buffer Planner for Complex Design Structure

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Motivation:

- ❖ With Complex Design structures and Congestion hot spots in design are limiting EDA ECO placer while adding and placing signal repeaters along the expected path.
- ❖ When EDA ECO placer are not able to put signal repeaters at desired locations it lead to manual interaction and repetitive process.
- ❖ Fig 1,2 and 3 shows one of the cases where EDA ECO Placer fails to find the correct locations and deviates from expected
- ❖ With Such scenarios witnessed we developed "Congestion aware Buffer Planner for Complex Design Structure" algorithm which takes congestion and Complex design shapes in account and Estimate trajectory for the path and use it for signal repeater insertion.

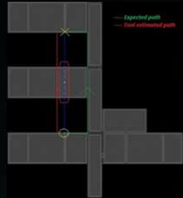


Fig 1. Example of Complex Design Shape Signal Repeater Locations Expected Vs Actual

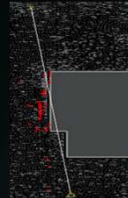


Fig 2. Example of Net going Through Congestion Hotspot

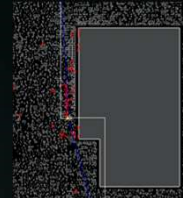


Fig 3. EDA ECO places Repeater in congested location

Core Implementation Algorithm Flow:

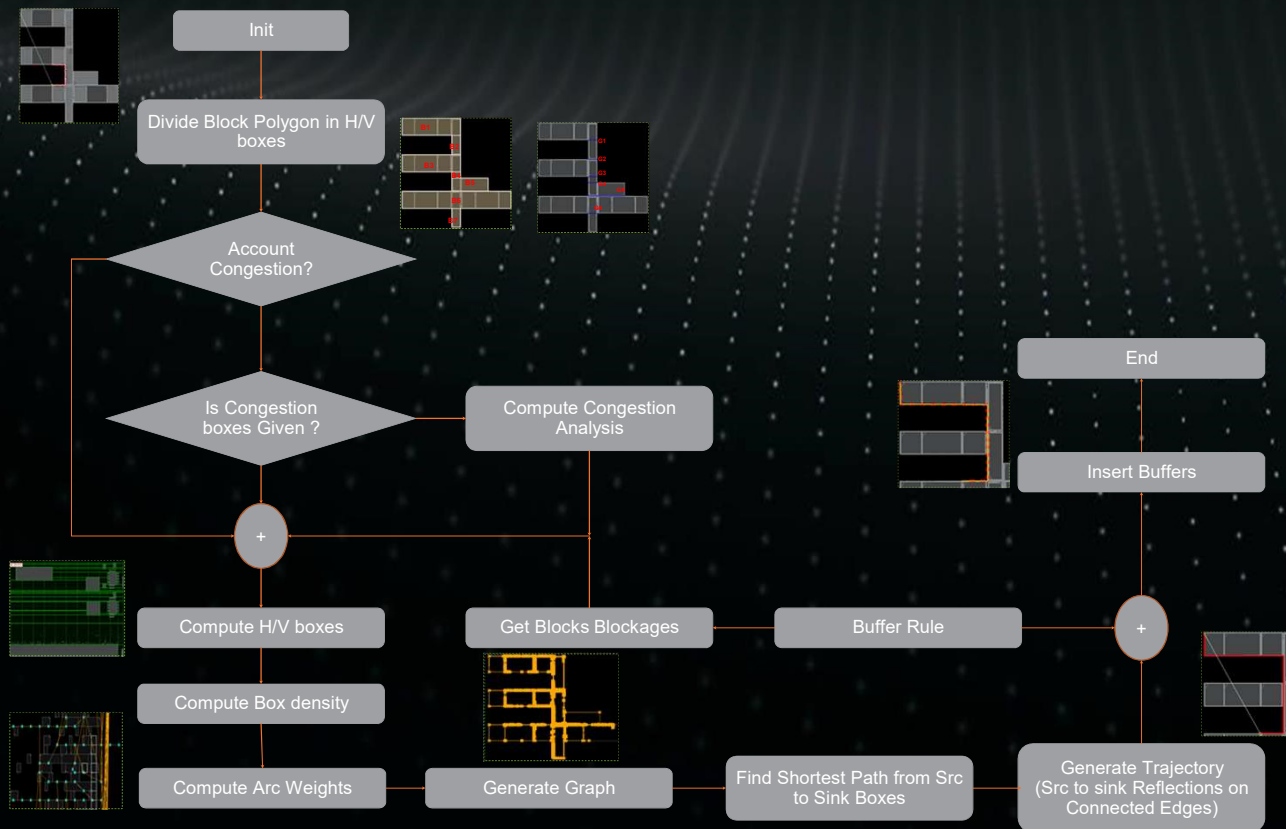


Fig 4. Core Implementation Algorithm

Evidence :

Fig 5. Shows Computed Repeater Locations for a complex shape Block, Which finds the minimum possible path trajectory with congestion hot spot avoidance

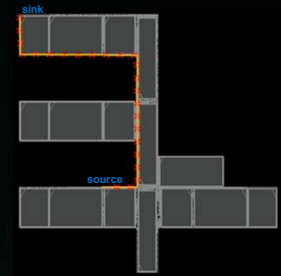


Fig 5. Repeater Locations (Red) using Algorithm

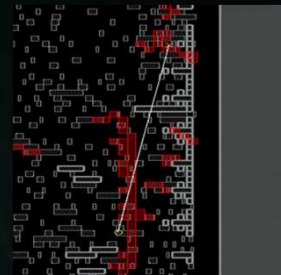


Fig 6a. Shows net whose driver and sink are located in congested locations. Fig 6b. Shows Computed Repeater Locations (White Star) taking congestion into consideration.



Fig 6b. Buffer Locations (White) and Path Trajectory (Green)

Summary :

- ❖ Computes Best possible Trajectory for Inserting Repeaters which
- ❖ Avoids congestion Hot Spots
- ❖ Independent of Complex Shape of Block.
- ❖ The Computed Data can be re-used for future implementations, as long as Congestion Data remains constant.

Future Scope :

- ❖ Enable it for high fanout Nets
- ❖ Reduce Computational Time