Global Routing with Cell Replacement

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1. Introduction

- State-of-art Global Routers assume that **cells can not be moved**
- Placing tools use routing **estimates** to guide their optimizations
  - These estimates may **not be accurate**
- **By moving a small set** of cells (less than 25%) we can achieve an **improvement of up to 60%** of the **wirelength**
- During Global Routing we can further improve metrics that were estimated in the previous steps

Goal

A Global Routing framework proficient to replace a set of cells to improve metrics such as wirelength and timing, while preserving the optimizations already made in the previous steps.

2. Workflow

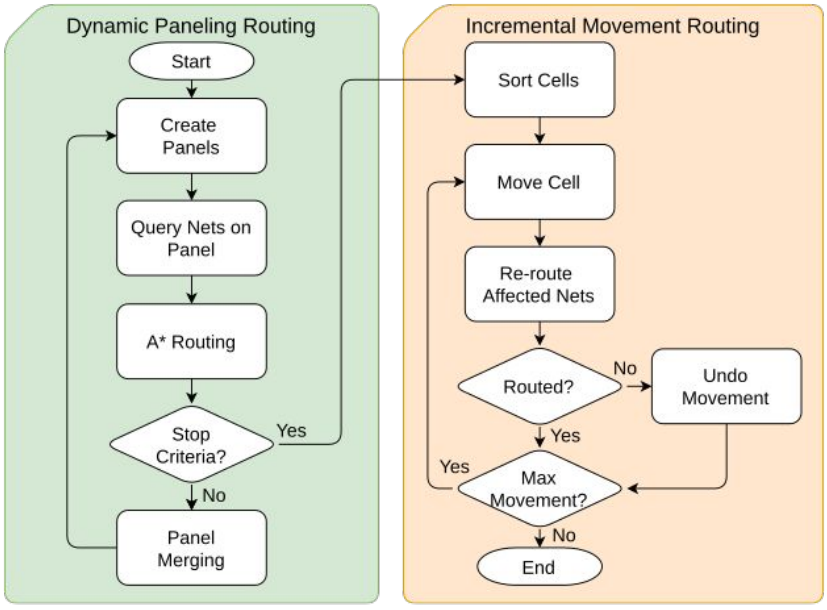

Fig. 1: The Flowchart of the Proposed Framework

The proposed framework has two main parts:

- **Dynamic Paneling Routing :**
  Reroutes the nets with A*
- **Incremental Movement Routing:**
  Moves cells and reroute affected nets

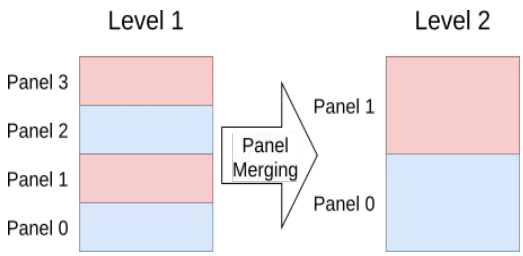

Fig. 2: Dynamic paneling merges the panels in each level

3. Preliminary Results

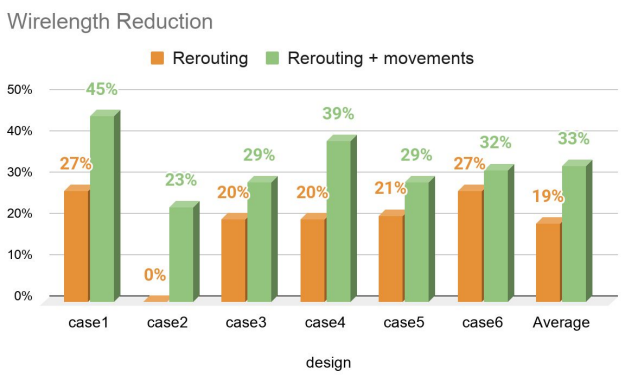

Fig.3: Results in wirelength reduction achieved by the proposed global routing framework.

4. Next Steps

- Running in more realistic benchmarks
  - ICCAD 2019 circuits
  - ISPD 2019 and 2018 circuits
- Evaluate different metrics
  - Timing
  - Density
  - Congestion
- Compare all metrics after Detailed Routing