ICCAD 2019 Contest
## LEF/DEF Based Open-Source Global Router

Introduction

Due to the increasing complexity and enormous solution space of the VLSI routing problem, the routing is typically split into two stages -- global routing and detailed routing. In global routing, the routing region is divided into rectangular grid cells (GCells) and represented using a coarse-grained 3D routing graph. Capacities and various constraints are assigned to the edges and vertices in this 3D routing graph so that overall routing topology and layer assignment can be optimized considering routability, timing, crosstalk, power, etc.

Problem Description

Assuming that a placement solution is already well-optimized for multiple metrics (e.g., timing, routability, etc.), a global router needs to provide a 3D global routing solution which the detailed router can then use as guidance to generate a DRC-clean routing solution. Toward this end, the global routing solution must maximize routability, pin accessibility, etc. to ensure that the disturbance of net topology during detailed router is minimized.

The figure below shows an example of a valid global routing solution for a 4-pin net. Connection between GCells are represented in "Guide" format which is from GCell center to GCell center with route guide width equal to GCell width. Note that in this solution, all four pins of the net are covered by route guides and all route guides form a connected structure.

(a) 2D   (b) 3D

Guide (M1)   Guide (M2)   Guide (M3)   ● Pin   ····· A routing solution
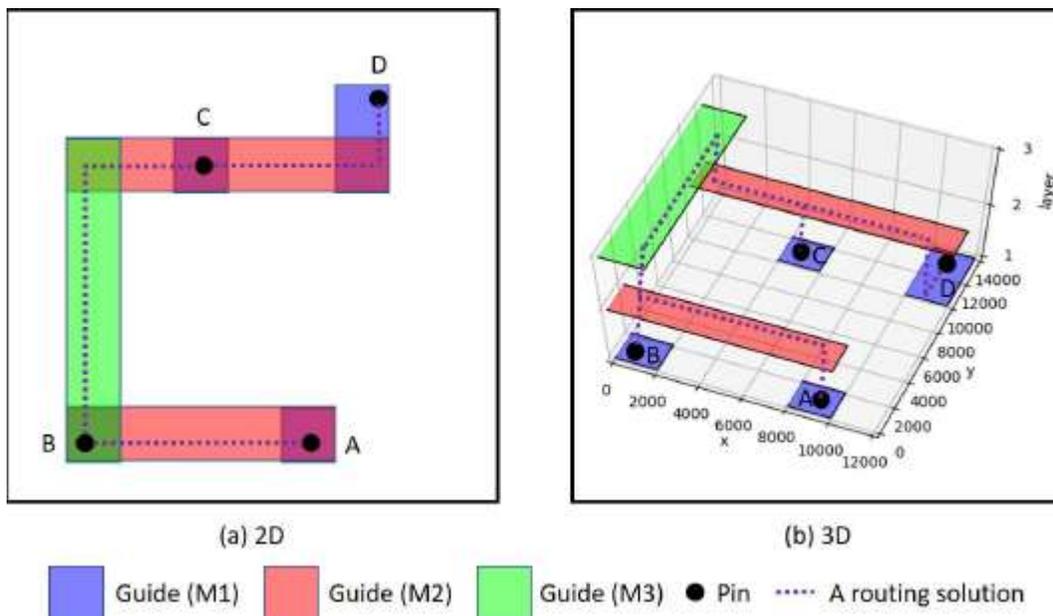
Input/Output Format

The design and technology are provided in LEF/DEF format. Teams need to parse design and technology information (e.g., pin shape, location, track definition, etc.) from LEF and DEF files. A good starting point is the LEF/DEF parser [here](#).

The output file format will be a variation of the ISPD18/19 routing guide format. This choice of input/output formats is intended to make it possible for as many academic teams and tools as possible to access this contest, and to enable integration with both commercial tool flows and the academic detailed routers created for the ISPD18/19 contests.

Router Evaluation and Ranking

Each global routing solution is considered valid if:
1. Global routing solution for each net has a connected (not necessarily tree) structure
2. Global routing solution for each net overlaps every pin of the corresponding net

The global routing solution will be evaluated using the executables of one or more academic detailed routers. Final score of each team will be a weighted sum of detailed router scores scaled by a runtime factor. Teams are allowed to use multi-threading in their router, but they will received a penalty factor if their router is non-deterministic.

Open-Sourcing Bonus

The organizers have augmented the available prizes as follows. The highest prize-winning team that releases their code under a BSD, MIT or Apache license during ICCAD-2019 will receive a bonus prize (given in $USD) of 4X their awarded prize. Thus, this team would receive a total of 5X their original prize money. Similarly, the second (resp. third) highest prize-winning team that releases their code under a BSD, MIT or Apache license during ICCAD-2019 will receive a bonus prize (given in $USD) of 2X (resp. 1X) their awarded prize.

Contest Organizers

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