

Complex routing design rules and the ISPD 2018/2019
Initial Detailed Routing Contests

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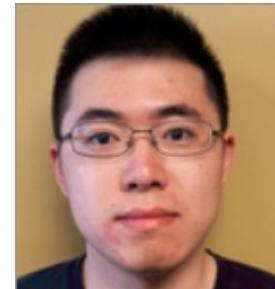
Contest Organizers



Gracieli Posser
Contest chair



Stefanus Mantik
Benchmarks



Yixiao Ding
Benchmark testing



Amin Farshidi
Vice chair



Wen-Hao Liu
Past chair



William Chow
Evaluation

Routing complexity

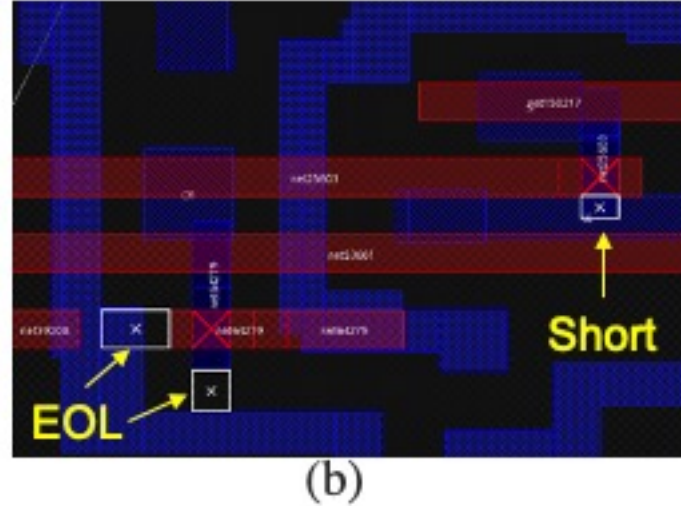
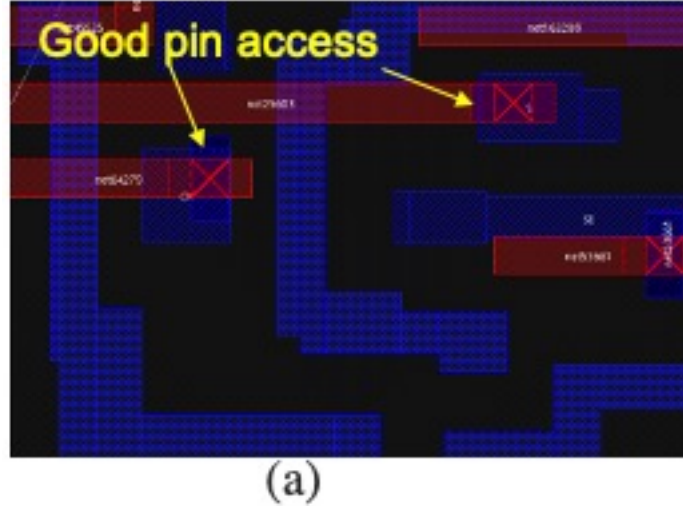
- Complexity on the design rules on new technology nodes
 - 5.8 LEF file has more than 1K
 - challenging and timing consuming
- Many rules, like:
 - spacing table
 - end-of-line (EOL) spacing
 - cut spacing
 - min area rule
 - parallel run spacing
 - adjacent cut spacing
 - corner-to-corner spacing

ISPD 2018 and 2019 contests

- Goals:
 - provide advanced routing rules and industrial designs to academia and EDA community
 - conduct leading routing research on the modern real designs
- Achievements so far:
 - new advanced research on routing
 - the benchmarks are used by academia not only for routing, but also to validate solutions on different Physical Design problems:
 - reinforcement learning (RL) based routing
 - partitioning tools
 - unified global-detailed routing
 - Synchronous reinforcement learning framework to search for net ordering strategies in detailed routing automatically with the objective to reduce the number of violations.

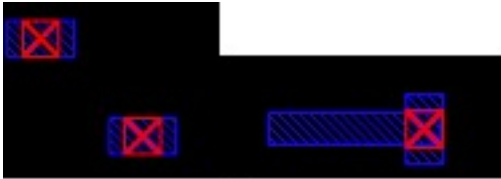
Routing Challenges

- Memory and runtime control
- Pin-access location selection

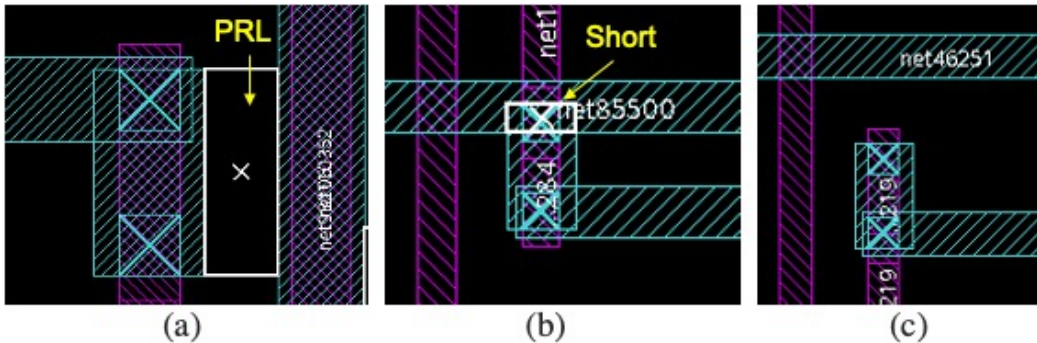


Routing Challenges

- Via selection
 - Vertical or horizontal

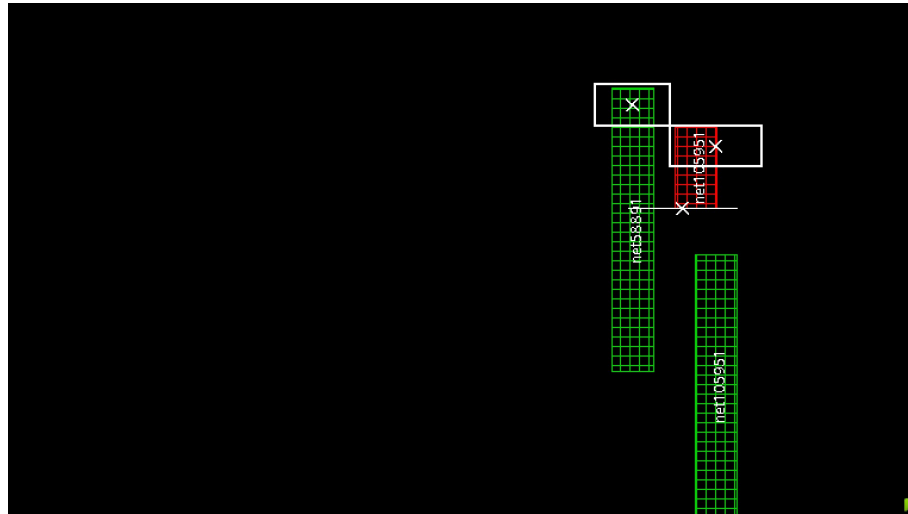


- Double cut via



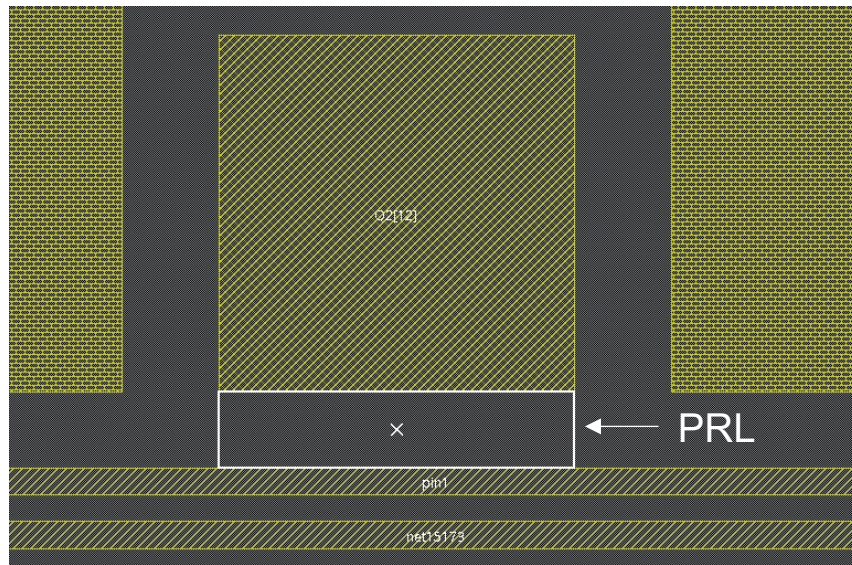
Routing Challenges

- Patch wire insertion



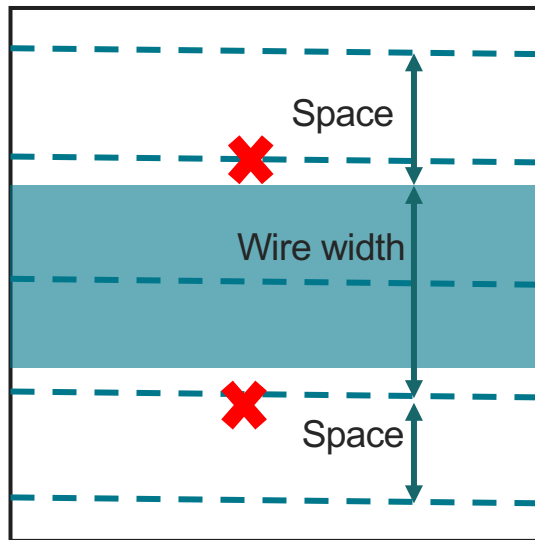
Routing Challenges

- Routing and instance blockages



Routing Challenges

- Non-default rule (NDR) handling
 - In the below example, NDR wire takes 3 tracks instead of 1 track for a standard wire
 - Wire is wider, then width + space blocks the two neighbor tracks





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