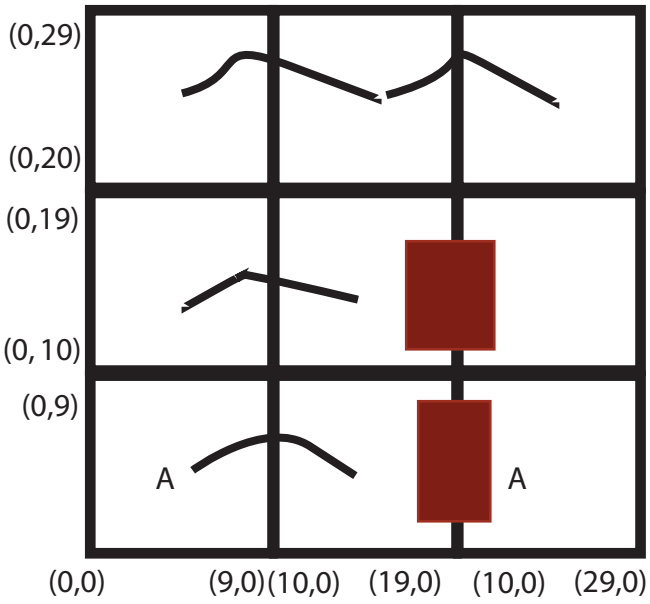
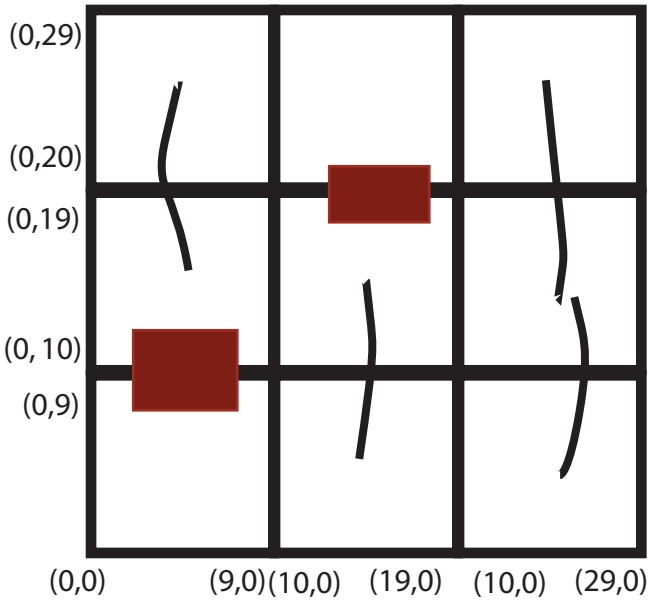
3D Routing problem with congestion to avoid

Layer 0 (lower horizontal)



Layer 1 (upper vertical)



Input File

```
grid 3 3 2
vertical capacity 0 1
horizontal capacity 1 0
minimum width 1 1
minimum spacing 0 0
via spacing 0 0
0 0 10 10
1
A 0 2 1
 5  5 0
25 5 0
4
1 0 0   2 0 0   0
1 1 0   2 1 0   0
0 0 1   0 1 1   0
1 1 1   1 2 1   0
```

Sample Output

```
A 0
(5,5,0)-(15,5,0)
(15,5,0)-(15,5,1)
(15,5,1)-(15,15,1)
(15,15,1)-(15,15,0)
(15,15,0)-(5,15,0)
(5,15,0)-(5,15,1)
(5,15,1)-(5,25,1)
(5,25,1)-(5,25,0)
(5,25,0)-(15,25,0)
(15,25,0)-(25,25,0)
(25,25,0)-(25,25,1)
(25,25,1)-(25,15,1)
(25,15,1)-(25,5,1)
(25,5,1)-(25,5,0)
!
```

This is a three dimensional routing graph with two routing layers. Each graph edge on a layer has a capacity of one, with the first layer having only horizontal capacity, and the second having only vertical capacity.

There is congestion in this graph; note the last four lines. These lines indicate that the capacity between a pair of routing tiles is reduced. The tiles will always be adjacent, and the number at the end of the line indicates the total capacity. The blockages are indicated on the illustration.

To route the net, it is necessary to via up and down several times, wandering through a maze. The solution consists of four horizontal segments, for vertical segments, and six vias, for a total "length" of 14. As with the planar solution, the positions of pins within a routing tile is not important for the contest this year. Next year, it is likely that the positions will impact the detail routing success.