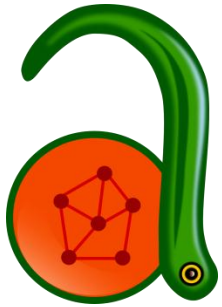
UNIVERSITÄT PASSAU
Fakultät für Informatik und Mathematik

Flexible VNE Algorithms Analysis using ALEVIN



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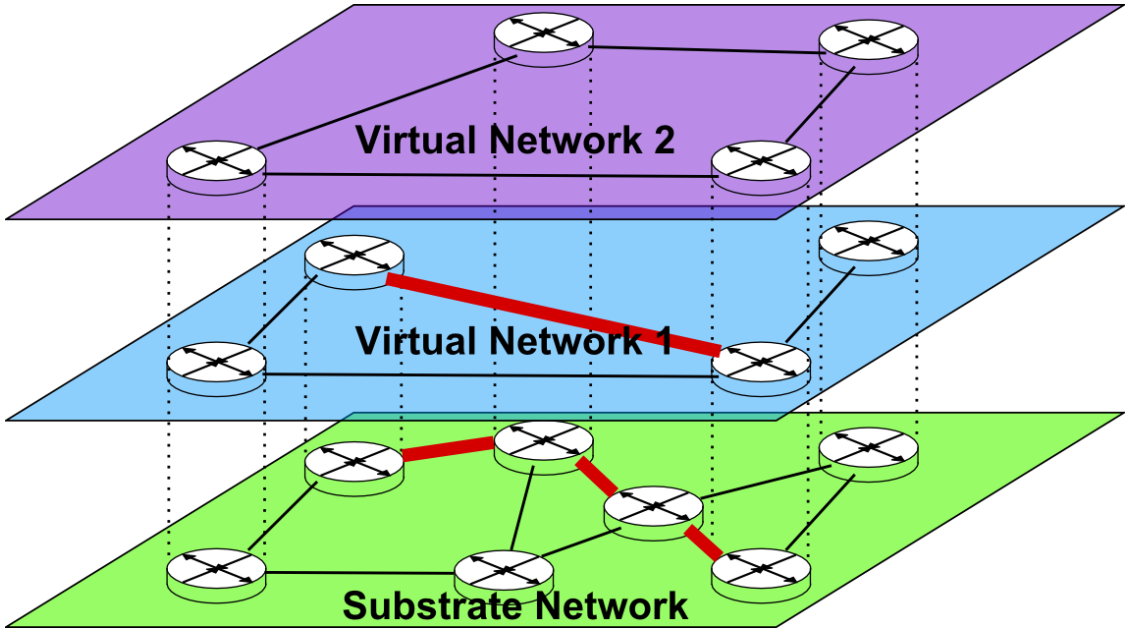
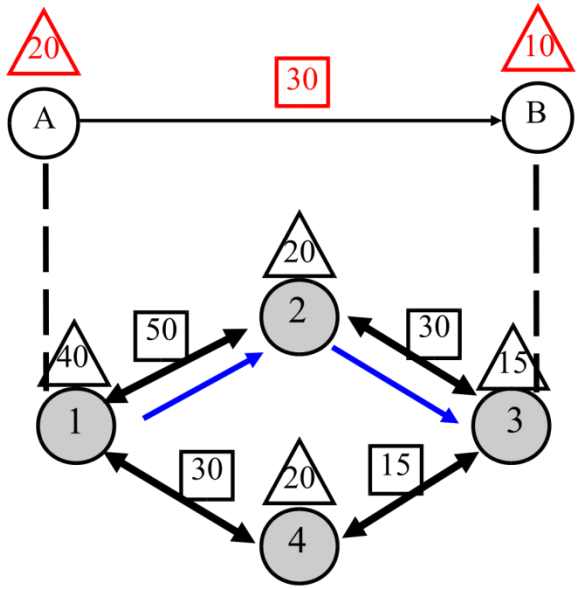
Problem description



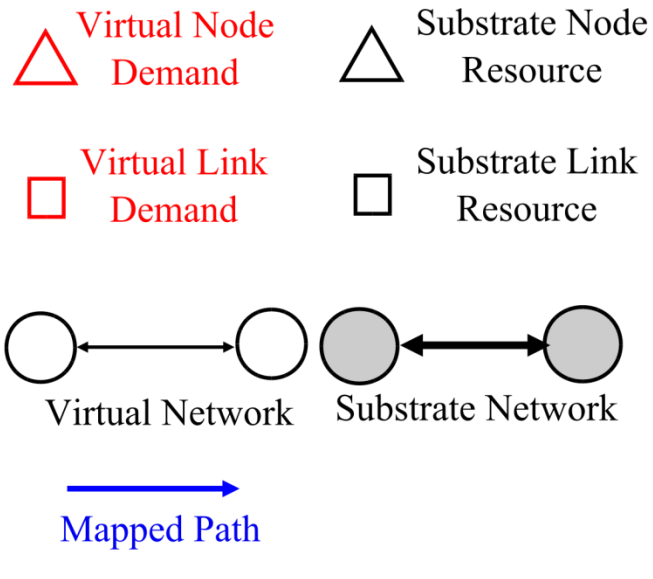
- Virtual Network Embedding (VNE): Map virtual resources to substrate resources
  - Substrate network provides resources
  - Virtual networks consume resources

Constraints & Problem complexity



Revenue:
Link **Revenue**: 30
Node **Revenue**: 20 + 10 = 30
Total **Revenue** of VN = 60

Cost:
- Link **cost** : 30 + 30 = 60
- Node **cost**: 20 + 10 = 30
- Total Cost = 90
(with same weigths)



- Embedding is NP-complete
  - Bin-packing problem (nodes)
  - Unsplittable Flow problem (links)

→ Different heuristics implemented in algorithms

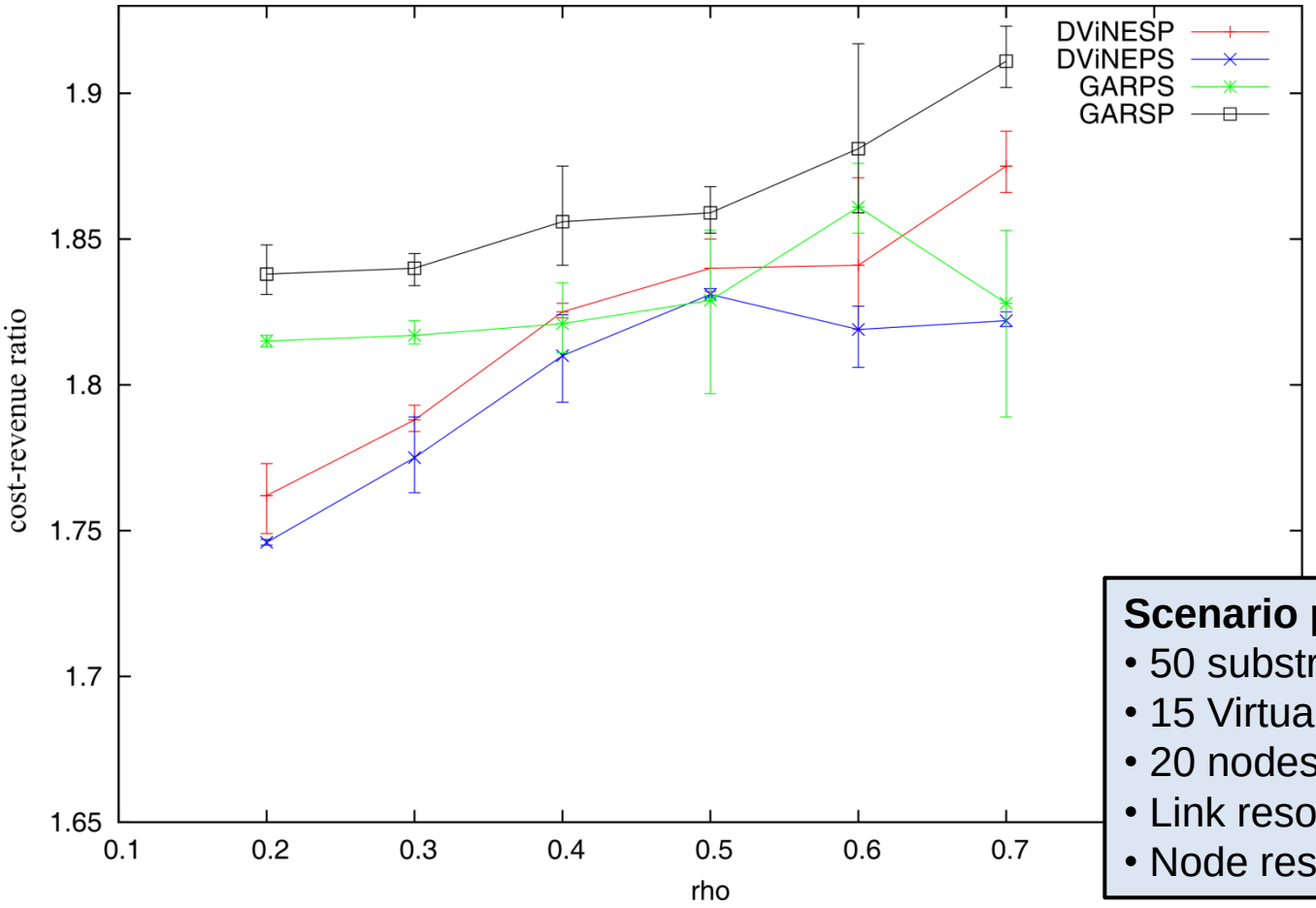
Optimization metrics

- Different ways to optimize VNE
  - Minimize cost/revenue ratio
    - Cost: Physical resources that have to be spent
    - Revenue: Virtual resources that can be mapped
  - Maximize acceptance ratio of virtual networks
- Take additional effects into account
  - Hidden hops: Traffic forwarding costs resources as well

- How to evaluate?

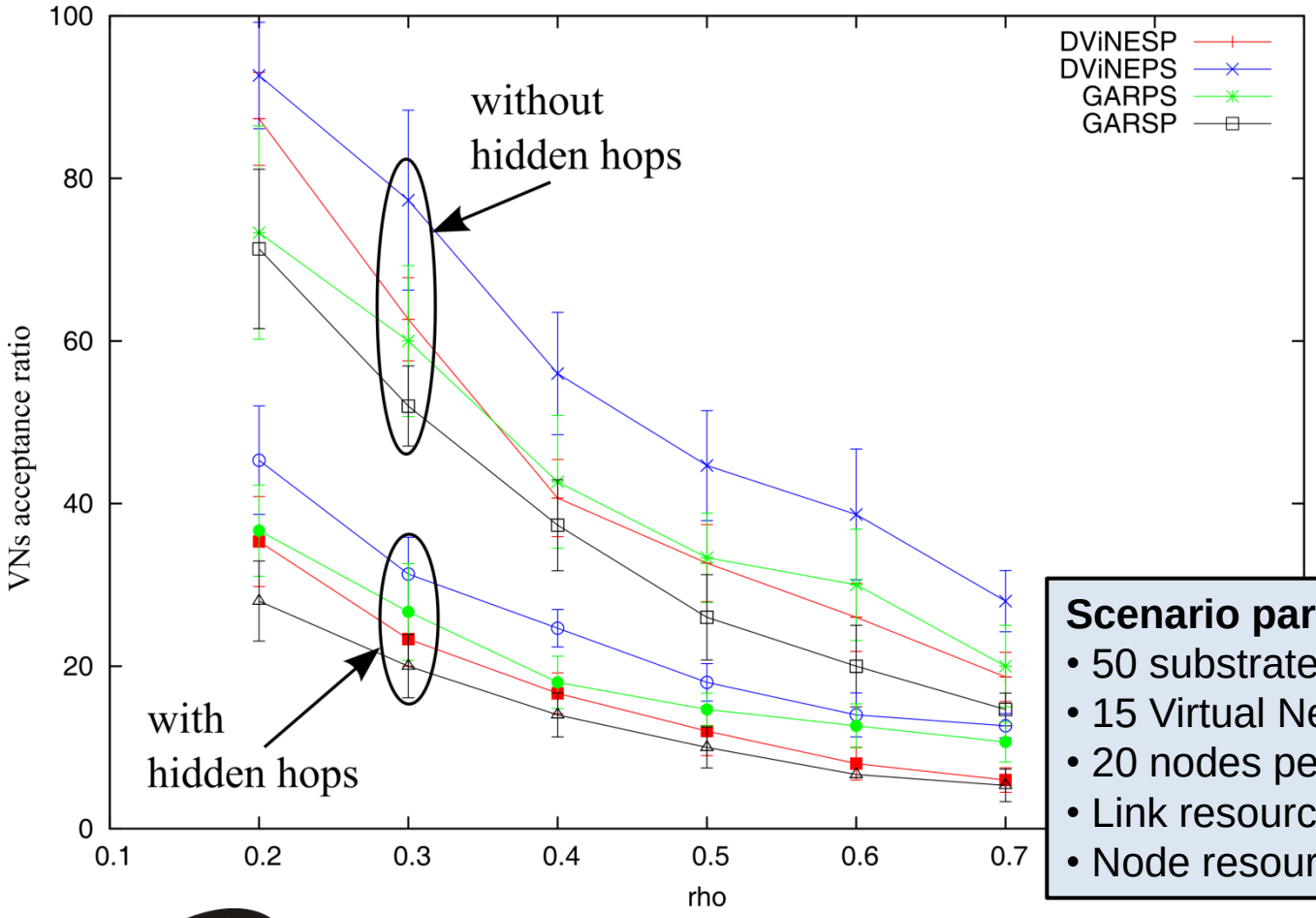
→ VNE simulation framework: ALEVIN (http://alevin.sf.net/)

Evaluation: Cost-revenue



Scenario parameters:
- 50 substrate nodes
- 15 Virtual Networks
- 20 nodes per VN
- Link resources: 0-100
- Node resources: 0-100

Evaluation: Virtual Network acceptance ratio



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Conclusions and Future Work

- Conclusions
  - ALEVIN provides framework to compare VNE algorithms
  - Additional constraints (hidden hops) influence algorithms
  - Further analysis is needed

- Future Work
  - Optimize embedding with regard to other goals
    - Energy consumption
    - Security / Resilience
  - Investigate application to large test-bed scenarios