

# Design of Resilient Multi-layer Core Networks

2 times 90 minutes

Michał Pióro

## Contents of the presentation:

1. Introduction. Basic formulations of for multi-commodity flow problems. Link-node vs. node-link formulations. Non-bifurcated flows and other routing restrictions. Modular link capacities and topological design. Importance of LP, MIP and IP models. (45 minutes)
2. Shortest-path routing of the OSPF type. MIP formulation for single shortest paths and for ECMP. Direct and two-phase approach. (45 minutes)
3. Basic resilience mechanisms and related design problems including path diversity, hot-standby, path protection and link protection. LP, MIP and IP formulations. (45 minutes)
4. Multi-layer modeling. One-state design problems. Design problems involving reconfiguration at different resource layers. Concluding remarks. (45 minutes)

## Summary:

The presentation will give an overview of the multi-commodity flow approach to modeling resilient multi-layer communication networks, including various routing/capacity constraints. We will discuss the importance of linear programming and mixed-integer programming in modeling and resolving the problems, and discuss related optimization approaches.

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