# A5 - Presentation Outline

| Title | Bus-Route Optimization |
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| Audience | non-experts |
| Relevance | Saving money, better for environment, better public transporation |
| Purpose | Describe existing concept |
| Thesis/Claim | Inform regulators about the usefulness of bus-route optimization |
| Pattern | Explain the benefits of bus-route optimization and the working principles |

## Introduction

**Capture attention:** Tranportation accounts for 5% of the GDP of Europe ("Transport Sector Economic Analysis - European Commission"). Trasportation also accounts for an etimated 30 percent of national greenhouse gases. This means that optimizing the routes for vechicles, such as buses, can have large impact for saving time, money and the environment.

**Establish credibility:** My name is Jaan Tollander de Balsch and I'm an student at Aalto University majoring in applied mathematics.

**State your topic and purpose:** Today, I would like to talk you about how the use of mathematical optimization can be used in creation of efficient bus routings for bus networks. I will tell you about how problem of this kind are formulated and how they can be solved.

**Preview main points:** This talk is divided into three part. First, we'll talk why bus-route optimization is useful and important. Then we'll move on to the how the optimization works and what kinda of data is needed to obtain real life values for the solution. Lastly we'll conclude the how bus-route optimization can benefit both, the providers and the customers.

## Body of Talk

1) In order to formulate the bus-routing problem we need to define ... ("Route Optimization Algorithm.."), ("Vehicle Routing Problem - Wikipedia"),
   - Objective, minimize the cost function
   - Constraints, what are the features we want to avoid
   - Real life data, numerical estimates for the parameters for the formula
2) Now that we have looked at the the data required to formulate the bus-routing problem, I am going to explain how is the actual optimization is performed. We are going to look at optimization methods and existing

solvers … ("Genetic Algorithm - Wikipedia"), ("Gurobi Optimization - the State-of-the-Art Mathematical Programming Solver")

- Example of genetic optimization algorithm
- Existing solvers, software that can solve optimization problems

3) So now that we understand what is required for bus-route optimization and how it can be solved, lets review the benefits of the obtained solutions …

- The benefits of using bus-route optimization
- Potential savings in time, money and the environmental impact

## Conclusion

**Summarize the main points:** Now that we understand what bus-route optimization consists of and how it can be solved and we have looked at the benefits for saving time and money as well as the positive environmental impact we can conclude that bus-route optimization is investment that is well worth it.

## References

"Genetic Algorithm - Wikipedia." https://en.wikipedia.org/wiki/Genetic_algorithm.

"Gurobi Optimization - the State-of-the-Art Mathematical Programming Solver." http://www.gurobi.com/.

"Route Optimization Algorithm.." https://www.slideshare.net/Mazhar_Nazik/route-optimization-algorithm-57634160.

"Transport Sector Economic Analysis - European Commission." https://ec.europa.eu/jrc/en/research-topic/transport-sector-economic-analysis.

"Vehicle Routing Problem - Wikipedia." https://en.wikipedia.org/wiki/Vehicle_routing_problem.