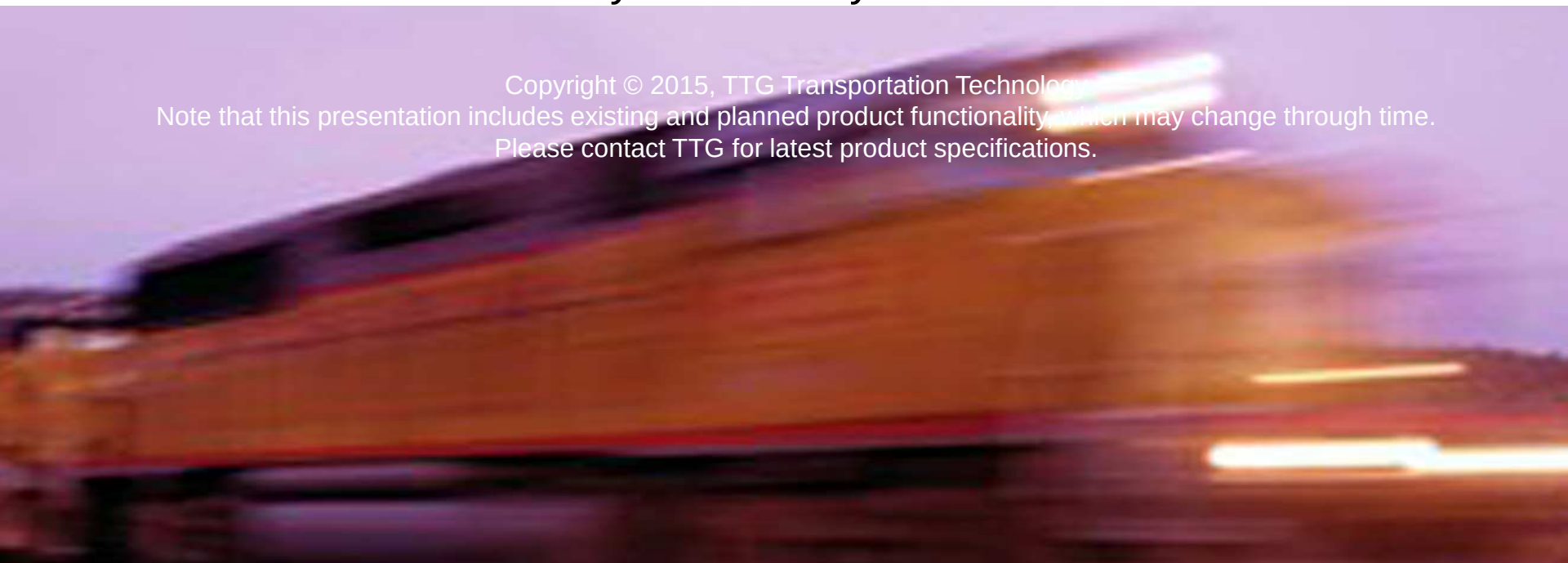
Train Scheduling and C-DAS

Bruno Lambla – TTG Transportation technology

Peter Pudney – University of South Australia



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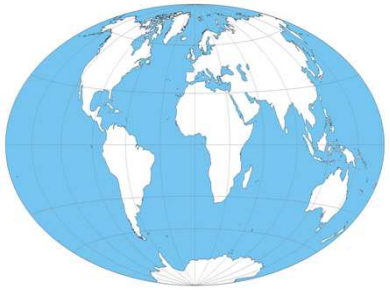
20+	Operators
7,300+	On-board units
40,000+	Track km
6 to 16	% Energy savings

Market Leader DAS technology

- Passenger Trains
- Fret Trains
- Electric
- Diesel



Offices in Australia, Europe and Asia

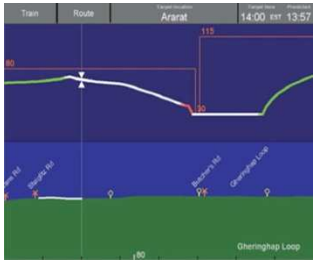
Customers on 4 continents

Leading edge research

"Performance Built on Trust"

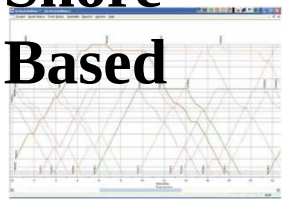
Solutions

On-Train

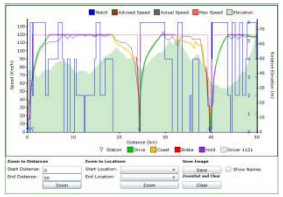


Driver Advice

Shore-Based



Timetable optimization



Journey analysis

Technologies

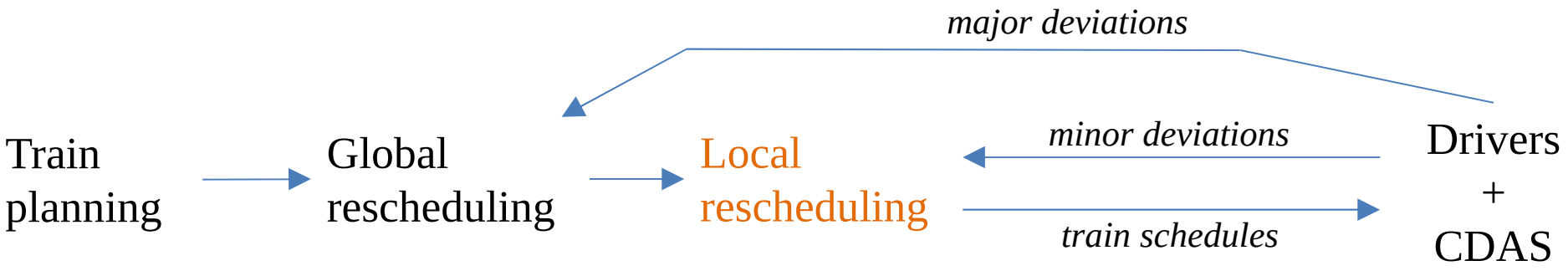
Optimal Control theory	IOS, Android, Windows	Business Intelligence	SOA
Timetable Optimization	Mobile apps	Integration	Hardware design

Train planning → Drivers

train schedules

Train planning → *train schedules* → Drivers + DAS


Train planning
Global rescheduling
deviations
train schedules
Drivers
+ C-DAS


major deviations
Train planning
Global rescheduling
Local rescheduling
minor deviations
train schedules
Drivers + CDAS

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Train schedules and DAS

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Include slack in schedules

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Meeting the timetable

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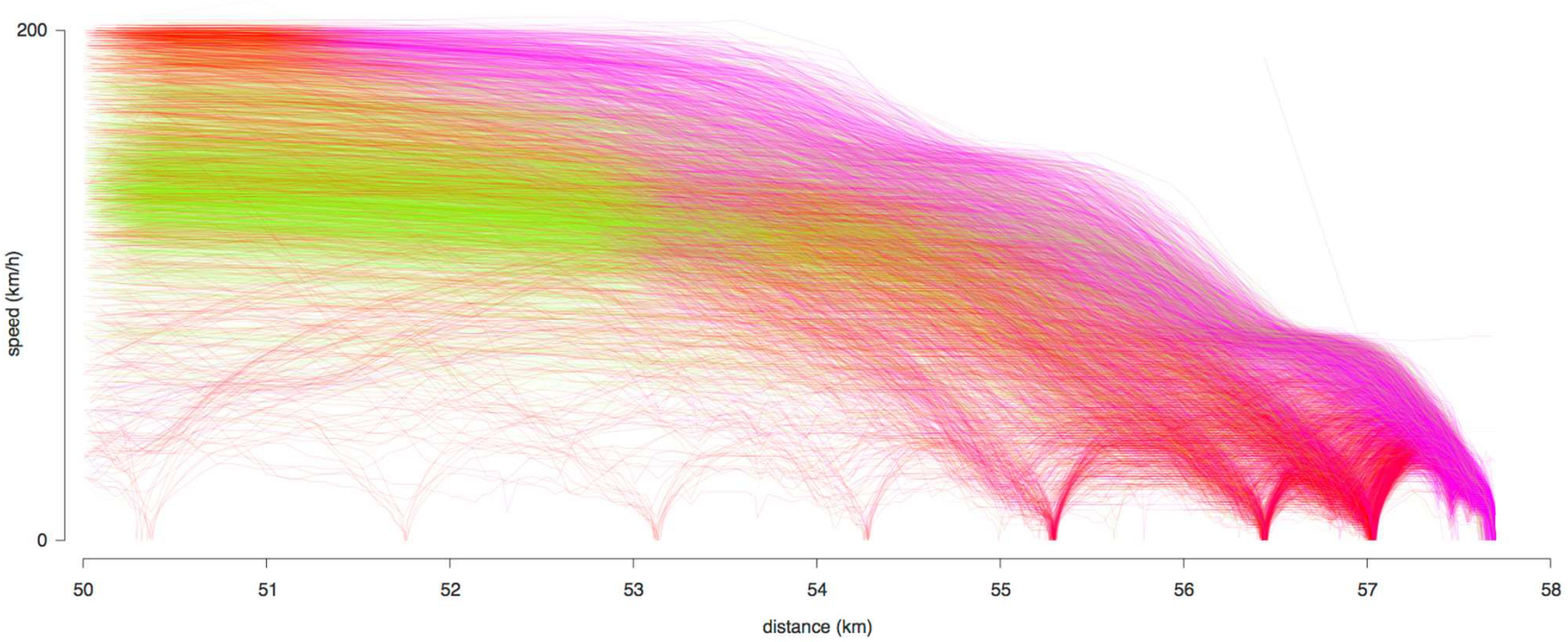

Distributing the slack

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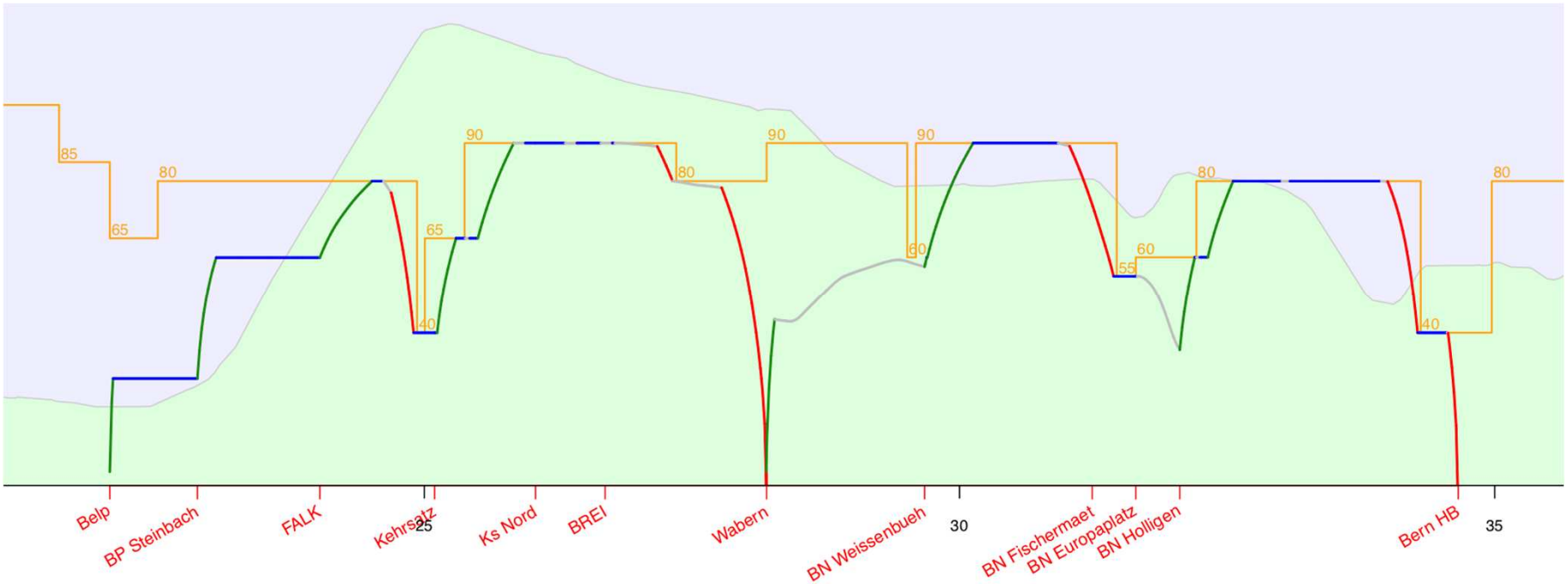

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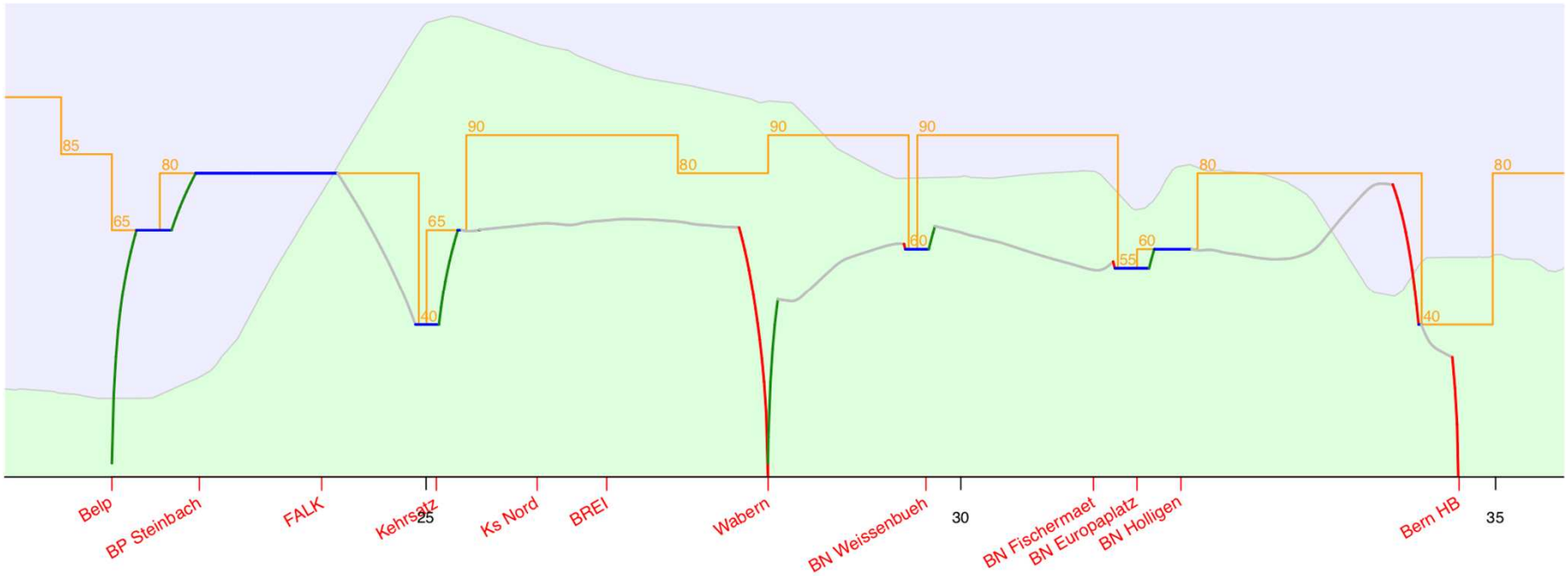

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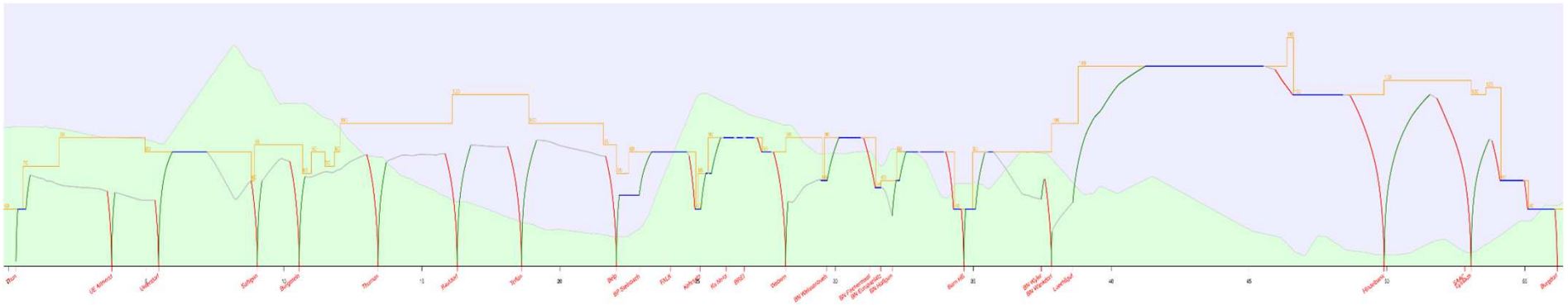
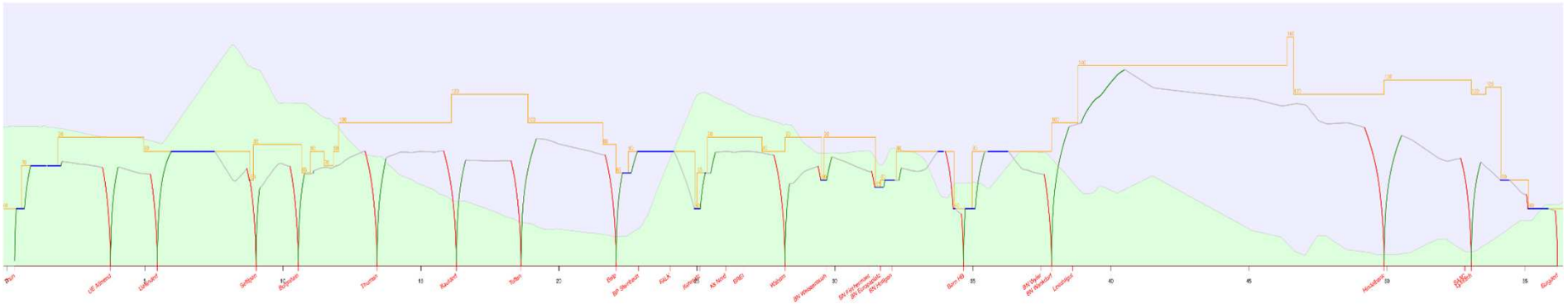
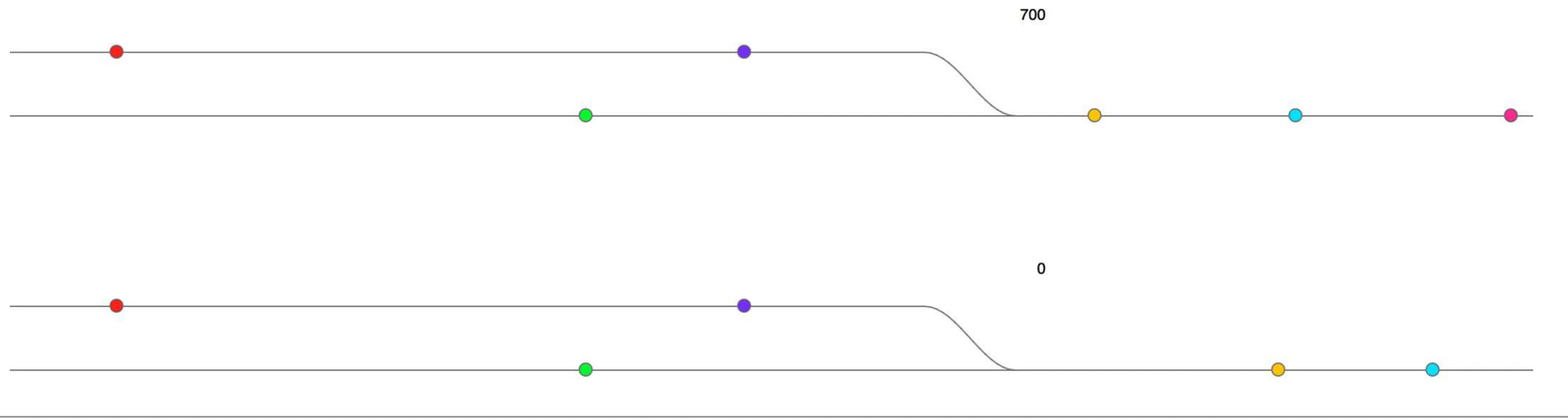




Local scheduling

Junction Scheduling



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Airport Junction

updates	trains	delayed	% delayed	Jeffreys interval
no updates	198	12	6.1%	[3.4%, 10%]
with updates	315	5	1.6%	[0.6%, 3.4%]

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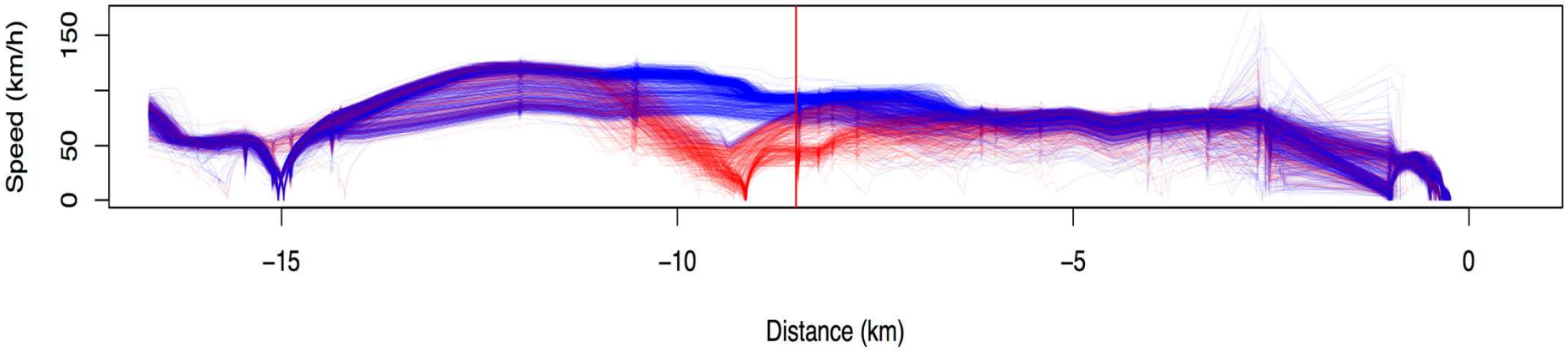
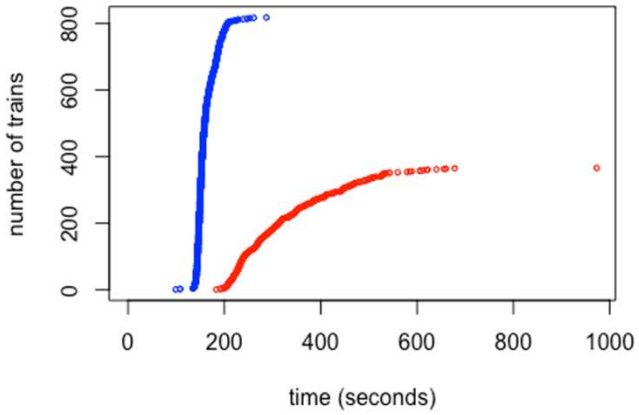
Transportation Technology





number of non-delayed trains	818	69%
number of delayed trains	366	31%
mean traversal time of all trains	214	seconds
mean traversal time of non-delayed trains	161	seconds
potential time saving (per train)	53	seconds per train
potential time saving (per day)	25	minutes per day

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Conclusions

- DAS allows train schedules to be executed precisely.
- We can use data from DAS to calculate robust train schedules that also consider energy use.
- Signaling is for safety, not for pacing trains. Local rescheduling can pace trains to ensure smooth flow of trains through junctions.