Train Scheduling and C-DAS

Bruno Lambla – TTG Transportation technology
Peter Pudney – University of South Australia

Copyright © 2015, TTG Transportation Technology
Note that this presentation includes existing and planned product functionality, which may change through time. Please contact TTG for latest product specifications.
TTG

Operators
On-board units
Track km
% 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

On-Train
Driver Advice

Shore-Based
Journey analysis

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

“Performance Built on Trust”
Train planning \(\rightarrow\) Drivers

\(\text{train schedules}\)
Train planning

train schedules

Drivers + DAS
Global rescheduling

Drivers + C-DAS

Train planning

deviations

train schedules
Train planning → Global rescheduling → Local rescheduling → Drivers + CDAS

- **major deviations**
- **minor deviations**
- **train schedules**
Train schedules and DAS
Include slack in schedules
Meeting the timetable
Distributing the slack
Local scheduling
Junction Scheduling
<table>
<thead>
<tr>
<th>updates</th>
<th>trains</th>
<th>delayed</th>
<th>% delayed</th>
<th>Jeffreys interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>no updates</td>
<td>198</td>
<td>12</td>
<td>6.1%</td>
<td>[3.4%, 10%]</td>
</tr>
<tr>
<td>with updates</td>
<td>315</td>
<td>5</td>
<td>1.6%</td>
<td>[0.6%, 3.4%]</td>
</tr>
</tbody>
</table>
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
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.