





## Signalling Systems – Design & Verification

Railway Simulation lies in the interface of Operation and Signalling. This interface has to be verified and tested well ahead of the construction of a line; a simulation is usually the only way to show that the system design can fulfil the contractual requirements.

Many infrastructure projects require a simulation as part of the contract, usually to be supplied by the turnkey supplier.

The type of interlocking and the design of the Signalling- and ATP system make a great impact on the final performance of the railway. Often railway systems are being run at the limit of their capacity. Simulation studies show in detail the impact of design and design changes.

Old ATP systems can no longer cater for today's traffic demands. They are being replaced with modern global standard systems like ETCS. We can show operators in detail how the implementation of a new system will change the performance as well as how operational rules have to be adapted to make full use of the suggested benefits.

## Capacity Investigations and Planning

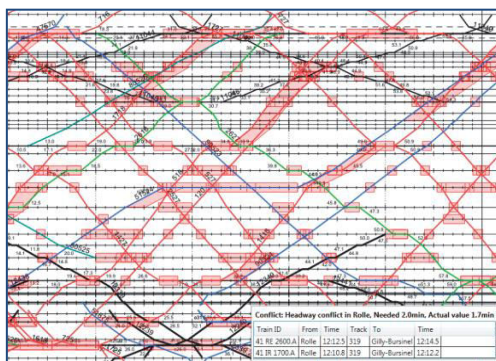
Rail traffic is constantly increasing; investigating the available capacity of current railway lines forms the first step in planning into the future. We follow the UIC standardized way of capacity evaluation.

Looking into the future, we can evaluate where additional line capacities are needed to cope with the future demand. Through simulations, we can evaluate what measures are needed for the capacity increase and compare available options.

## Feasibility Studies

Improving public transport is in almost every government's priority list. From the first idea to the start of the construction of a new line it's a long way. Simulation of the proposed line and its options form an integral part of the feasibility study.

In a structured approach we can evaluate the pros and cons of the options and give the decision makers a well-founded opinion.



## Timetables & Traffic Planning

- National Timetables
- Future Timetables
- Timeslot Planning
- Reduced service & Construction Timetables
- Vehicle Rostering

## Simulation & Planning

- Headway Simulation
- Runtime Simulation
  - Conflict detection
  - Timetable Simulation
- Train Capacity Verification
  - Optimizing Traffic Flow
  - Power Usage Studies
- Project Feasibility Study

## Timetable Data Management

- Data Visualisation
  - Data Validation
- System to System Interface

## Your Project Partner for Simulations

- Verification of contractual requirements
- System Performance and Failure Management Analysis

## Technical Support

- Training
- Full technical support for all our products!
- OpenTrack Software Project Setup and Technical Support
- Viriato Software System Setup and Technical Support

# OpenTrack Simulation Software

## OPENTRACK

### OpenTrack - The Software

OpenTrack is a state-of-the-art simulation software, designed for Operation Departments, Project Planning and Government consultants to conduct study of Operations, Timetables as well as Line and Signaling Layout verification.

OpenTrack is a planning and simulation tool developed by The Swiss Federal Institute of Technology Zurich and is supplied to over 360 licenses in more than 30 different countries.

### Simulation

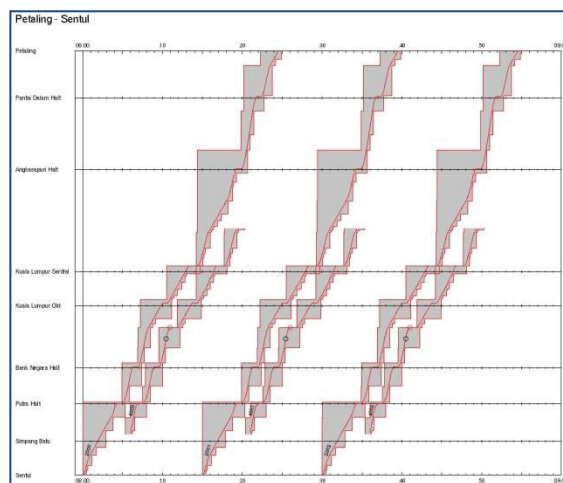
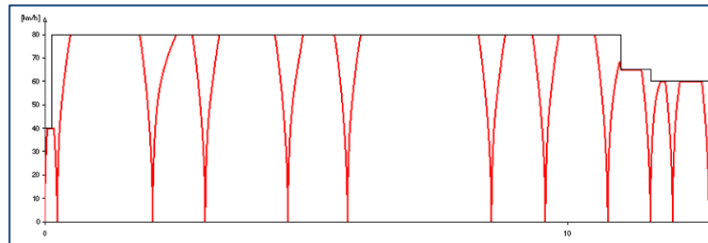
OpenTrack allows user-defined trains to fulfil the specified timetable on track layouts.

- Graphical visualisation on rail operation
- Localizing capacity bottleneck
- Evaluating how disturbances affect the network as a whole
- Evaluating impact of different ATP systems
- Evaluating and designing signalling systems
- Optimizing rolling stock scheduling

### Evaluation

OpenTrack performs a variety of different evaluations using the simulation data. These evaluations can be made on several different perspectives, for example, per train, per route and per station.

- Route conflict detection
- Tractive effort
- Power consumption
- Delay scenarios

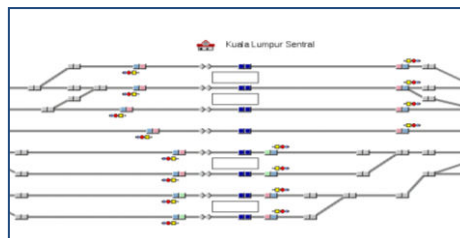
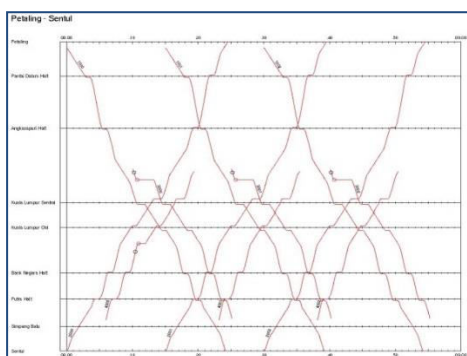


### OpenTrack core applications

- Runtime Simulation
- Headway Simulation
- Signalling Design Verification
- System Design Verification
  - Power Usage Studies
- Train capacity Verification
  - Timetable Verification
- Track Layout Optimization

### OpenTrack is used by

- Railway Operators
- Railway Project Suppliers
- Engineering Consultants
- Universities and Research



# Viriato Timetable Software

## Viriato Timetable Planning Software



SMA Viriato Software is a powerful integrated timetable planning tool and is used worldwide, with references in many of the major European Railways such as SBB, DB and SNCB.

Viriato allows users to optimize the railway network planning process by utilizing these functionalities;

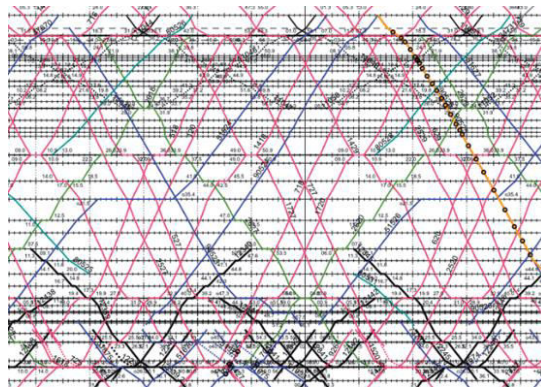
- Timetable Planning
- Graphic Timetable
- Customer Timetable
- Running Time Calculator
- Conflict Detection
- Interfaces to other Systems (e.g Ticketing, Traffic Management)
- Capacity Analysis

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15	17	17	17	15	15	17	17	16	16	15	17	17	17	16
	604	609			620	625				650	704	709		
					627					657				
	613				634	643				704	713			
	614				635	645				705 (1)	714			
615			631	647	650	657		701	715	720			731	747
616			632	648				702	716				732	748
618			634	650				704	718				734	750
619	628	630	635	651	654	701		705	719	724	728	730	735	751
620	629		636	652 (2)		702		706	720		729		736	752
621			637	654				707	721				737	754
623			639	656				709	723				739	756
625			641	657				711	725				741	757
627			643	659				713	727				743	759
629			645	701				715	729				745	801
630				702					730					802
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Implementing a new timetable planning tool for an operation railway is not an easy task to do. Rail Systems Engineering will do the entire implementation for our clients:

### Implementation Process

- Specify requirements
- Setup the system to current operational layout
- Train software usage and planning techniques
- Implement all interfaces to other systems
- Ensure seamless switchover to Viriato system



### We support in:

- planning future timetables
- planning new timetable strategies
- implementing clocked timetables

## OpenTrack and Viriato Software License

Rail Systems Engineering is the Southeast Asian representative for **OpenTrack** and **Viriato**.

### A software license includes:

- Unlimited time of use on one computer
- One year support and upgrades
- Initial training

## Services:

For our software products we provide the full scope of services:

- Sell the License
- Setup the system
- Setup the project
- Initial Training
- Assistance during project execution
- Software Service

# Data Interfaces – Data Visualisation

## Sharing Timetable Data

Once a timetable is produced it's usually shared for collaboration with partners and colleagues or it is transferred to other tools for further usage.

Often the timetable is base input of other system for their functionality.

We can prepare the data for the target system of your need.

## RailML

RailML is a standard Data Interchange format for Railway Data. It makes data interchange between tools and systems easy. And since UIC declared RailML as their standard for data interchange, its popularity has much increased.

Our tools OpenTrack and Viriato use RailML as standard data format for their output.

## Data Interfaces

Where a tool or system is not capable of understanding RailML we can provide custom data-interfaces to allow data interchange.

- Convert Timetable data to proprietary formats
- Filter, sort or modify data for different applications
- Validate Data
- Visualise Data

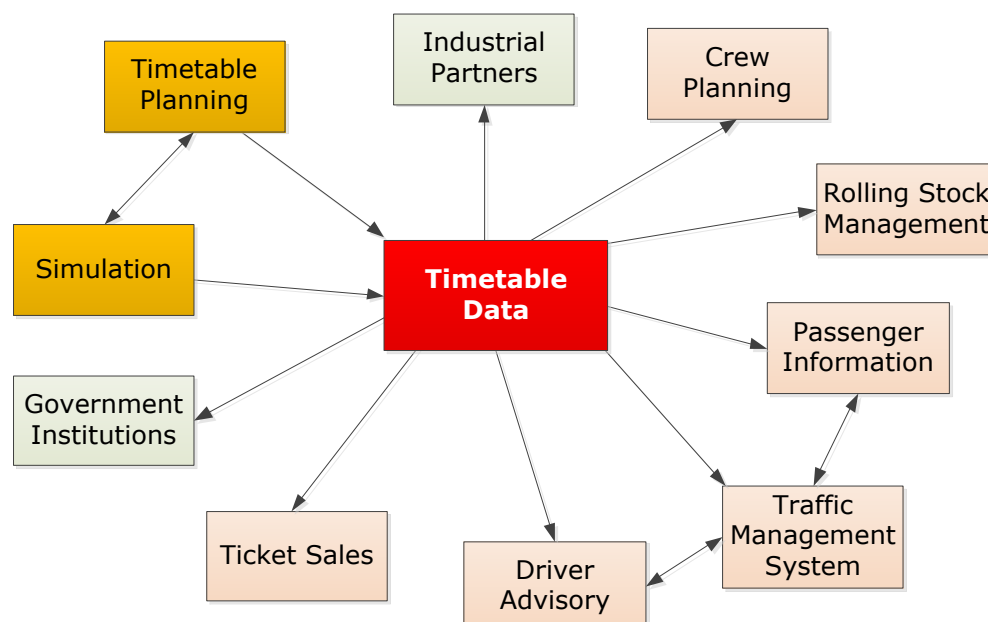
## Analyse Operational Data

We can analyse your operational data, visualise it and use it as input for further traffic planning.

6:05	7:16	8:58	11:05
6:14			11:14
6:28	7:31	9:13	11:28
6:38			11:38
6:44			11:44
6:53			11:53
7:04			12:04
7:12			12:12
7:20	8:01	9:43	12:20
7:29			12:29
7:36			12:36
7:50			12:50
7:53	8:20	10:02	12:53

## Data Management

- RailML competence
  - Data Conversion
  - Data Interfaces
  - Data Visualisation



# Power Studies

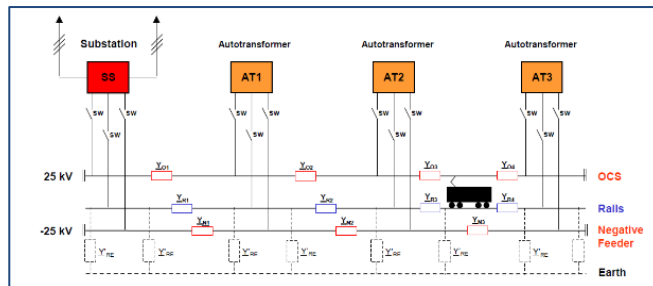
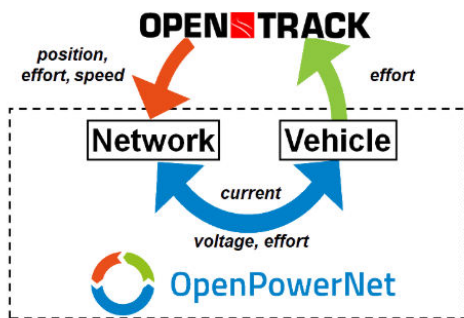
## Simulation of Railway Power Supply Systems

In addition to the simulations on operation, we also provide **Power Simulations**. We do in-depth analysis of Load Flow and Energy consumptions on the systems, from Substation, including the Feeder systems all the way to the train.

## Power Simulation



Power Simulations are done with **OpenPowerNet** which is an add-on software to OpenTrack.



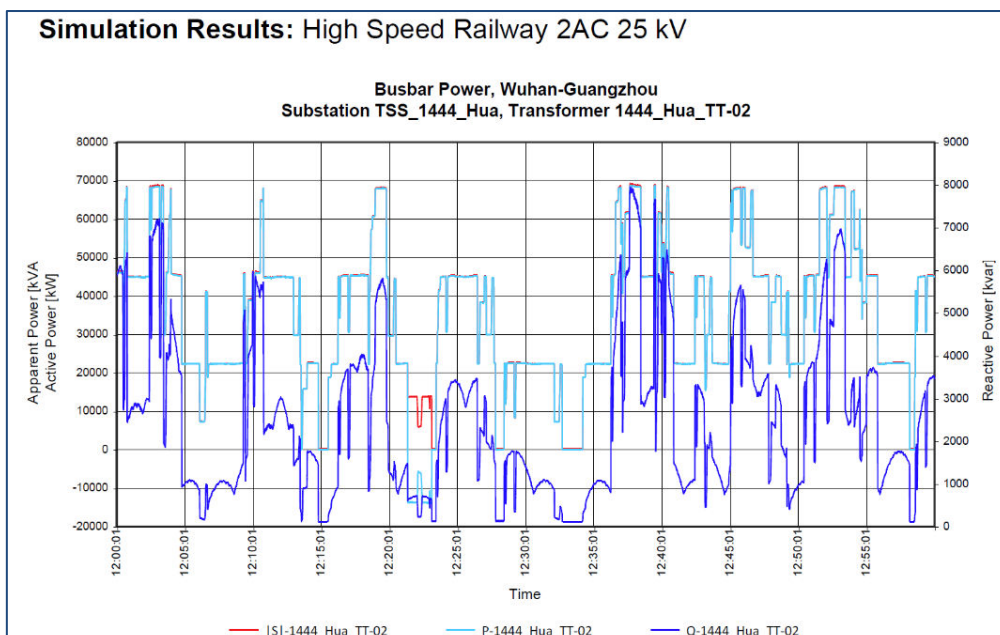
It takes into account:

- Simulation of all common AC- or DC- railway power supply systems
- Representation of entire electrical network structure
- Precise consideration of electromagnetic coupling
- Exact modelling of the trains propulsion system

Calculated results will be explained and discussed in a report.

- Minimum and Maximum pantograph voltage
- Number, location and proposed capacity (rms values for power and current) of the traction substations and corresponding feeder and return feeder cables
- Capacity of the contact line system (rms values for currents) including contact wire, messenger wire, negative feeder, running rails
- Calculation of energy consumption of the entire 25kV network, of each substation or of exemplarily for different train categories

## Simulation Results: High Speed Railway 2AC 25 kV



### **Rail Systems Engineering SB – Malaysia**

The company was founded in 2008; we are located and registered in Kuala Lumpur, Malaysia.

The company's main focused services are Mainline ATO, Operations Concepts, Simulation & Timetable Planning. We cover East Asia (all ASEAN countries), Korea, Taiwan, Sri Lanka, Bangladesh & Saudi Arabia.

### **Rail Systems Engineering AG - Switzerland**

In 2017 Rail Systems Engineering AG in Switzerland was opened, with focus on Train Protection, ATP & ETCS.

### **Rail Systems Software GmbH - Switzerland**

The company joins the group of companies in 2021. It is providing services with regards to Railway Infrastructure Data and Software Development for data management and handling.

We are the East Asian representative for the following Product Partners:

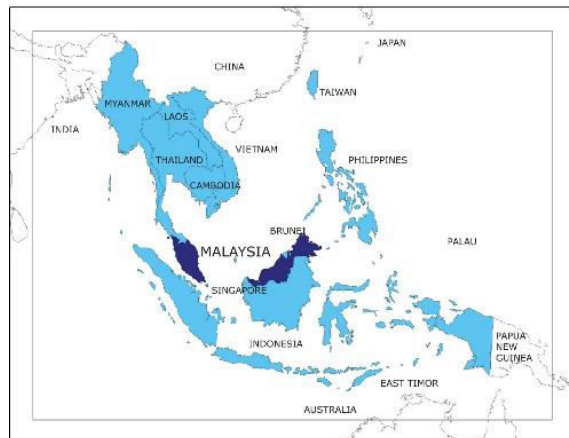
**OPEN TRACK**

**sma+viriato**



**RAIL  
SYSTEMS  
ENGINEERING**

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