

# OpenPowerNet

## Release Notes Version 1.13.0

**Institut für Bahntechnik GmbH**  
**Branch Office Dresden**

### Document No. OPN/RN/1.13.0

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## 1 Introduction

### 1.1 Overview

The purpose of this document is to describe the changes and the status of OpenPowerNet version 1.13.0. The document contains:

- List of delivered files on DVD,
- Description of the main functionality,
- Any restrictions known,
- List of corresponding documentation and
- Known issues.

### 1.2 Configuration

See document Installation Instruction version 1.13.0 for required third-party software versions.

### 1.3 Acronyms and abbreviations

The following abbreviations are used within this document.

Abbreviation	Description
2AC	2 Phase AC
AC	Alternating Current
ATM	Advance Train Module
DC	Direct Current
DVD	Digital Versatile Disk
EFE	Engine File Editor
GUI	Graphical User Interface
NMMV	Network Model Microscopic Viewer
OCS	Overhead Catenary System
ODBC	Open Database Connectivity
OPN	OpenPowerNet
OT	OpenTrack
PDF	Portable Document Format
PSC	Power Supply Calculation
SoC	State of Charge
VLD	Voltage Limiting Device
XML	Extensible Markup Language

OPN/RN/	 OpenPowerNet	 Institut für Bahntechnik GmbH
Page 3 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

## 2 List of files on DVD delivery

OpenTrack/ (all installation files)  
MCRInstaller\_R2013b\_82\_win64.exe  
openpowernet\_01.13.00.msi  
openpowernet\_system\_components\_01.13.00.exe  
OPN\_InstallationInstruction\_1.13.0.pdf  
OPN\_ModellingCheckList\_1.11.0.pdf  
OPN\_ReleaseNotes\_1.13.0.pdf  
OPN\_UserManual\_1.13.0.pdf

OPN/RN/	 OpenPowerNet	 Institut für Bahntechnik GmbH
Page 4 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

### 3 Main functionality

OpenPowerNet version 1.13.0 has the following main functionality:

- Calculation of AC, 2AC and DC power supply system,
- Calculation of magnetic coupling of conductors is done internally,
- Possible electrical network configurations include, but are not limited to:
  - Highspeed railway,
  - Freight railway,
  - Metro systems with OCS or 3<sup>rd</sup>/4<sup>th</sup> rail,
  - Monorail systems,
  - Tram networks,
  - Trolleybus networks,
  - Battery buses with charging station.
- AC / 2AC power supply models:
  - Transformer,
  - Static Frequency Converter (SFC),
  - Auto transformer,
  - Booster transformer,
- DC power supply models:
  - Rectifier/Inverter,
  - Stationary energy storage for stabilisation of line voltage and energy saving,
  - Voltage limiting device model to limit the touch voltage,
- Calculation of tractive effort with retroactive effect to the railway operation simulator OpenTrack,
- Consideration of regenerative braking,
- Consideration of tractive and braking current limitation,
- Consideration of power factor at vehicle pantograph,
- Calculation of electrical engines with single or multiple propulsion systems,
- Division of power consumption for multiple train operating companies,
- Evaluation of engine energy storage charging from regenerative braking and/or catenary,
- Evaluation of catenary-free operation,
- Consideration of coasting behaviour of the courses,
- Consideration of changing train mass at station stops,
- Calculation of short circuit currents,
- Quick evaluation of network structure using constant current engine model,
- Visualisation of results using prepared Excel-Files and
- Visualisation of results using the automated analysis of the Analysis Tool generating Excel and PDF files for:
  - Minimum pantograph voltage,
  - Maximum touch voltage,
  - Maximum leakage current,
  - Substation:

OPN/RN/	 <b>OpenPowerNet</b>	 <small>Institut für Bahntechnik GmbH</small>
Page 5 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

- Feeder current versus time and as TRLPC<sup>1</sup>,
- Busbar voltage versus time,
- Power (P,Q,S) versus time and as TRLPC for input, output and total (per substation and total of all substations of a network),
- Power factor versus time,
- Magnetic Field as flux density (B-field) and field strength (H-field),
- Conductor and connector current versus time and as TRLPC<sup>1</sup>,
- Voltage versus time and as TRLPC<sup>1</sup>,
- Energy overview,
- Vehicle specific charts,
- Vehicle specific overview

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<sup>1</sup> The **T**ime-**R**ated **L**oad **P**eriods **C**urve (TRLPC) shows the maximum or minimum of a set of varying window-size averages where the window time duration is defined by the x-axis value.

OPN/RN/	 <b>OpenPowerNet</b>	 Institut für Bahntechnik GmbH
Page 6 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

## 4 Changes

### 4.1 Version 1.13.0 vs. 1.12.00

#### 4.1.1 New Features

- OPN-10457: PSC Automatically set reference node
  - The Project File XML element PSC/Network/ReferenceNode is now optional. If it is not defined, the node for the reference voltage will be automatically selected by searching conductors of type Earth, Rail and then others at the first Slice of the first Line.
  - Abort model creation if the Network has no Lines.
- OPN-15010: SimS Allow configuration of switch and engine file in SimS editor
  - It is now possible to define engine file and switch state file on the Co-Simulation Scenarios page. Values will be taken from the project file on first selection or if both cells are empty when selecting a new project file.
  - New restriction: It is not allowed to define a path for engineFile or switchStateFile attributes in the project file that points outside of the SimS project folder anymore, which had already been a warning previously.
  - The attribute engineFile in project file is now optional as the file may be set in the SimS file.
  - Improve error message in case the user opens a SimS file in an OPN version with an older model version support or if the model version of the file cannot be processed. The user would get the message "No migrator found" and be left with a defective editor previously.
- OPN-15394: Implement installer for OPN software
- OPN-15508: SimS Allow approval of modified files in scenario folder
  - If files in a scenario directory are changed, the user now has the ability to accept those changes by clicking on the red ! icon and choosing "Yes" in the dialog. This resets the scenario status and allows the user to start the scenario using the changed files. Scenarios with accepted changes are marked by a yellow checkmark icon in the second button column.
- Additional changes in SimS editor:
  - Implement tool tips for the columns scenario, status and comment in run control.
  - Make scenario column wider and comment column narrower to more often fully show longer scenario IDs.
  - Make columns scenario, status and comment resizable while keeping buttons the same size.
  - Make the first two columns that only contain icons non-resizable in the OpenTrack scenarios and Co-Simulation scenarios pages.
  - Remove unnecessary horizontal scroll bar from SimS Editor tables that appeared randomly and messed with column resizing.
  - Changed the text in the scenario orchestration dialog so it fits all situations better instead of always referring to "changed scenario directories" and "locking the scenarios".
- OPN-15514: GUI Add toolbar and menu entry to start OpenTrack from within OPN
  - Add button and menu entry to manually start the OpenTrack application defined in OPN preferences from within the GUI.

OPN/RN/	 OpenPowerNet	 Institut für Bahntechnik GmbH
Page 7 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

- OPN-15544: ANA Mark generated Excel file with metadata
  - The generated Excel files have now a defined category at document properties.

#### 4.1.2 Improvements

- OPN-15234: Re-implement Analysis with significant shorter runtime
  - Analysis runtime is reduced by about 70% of the previous runtime.
- OPN-15343: ATM Improve error message in motor class
- OPN-15369: PSC Add gain parameter to converter controller
  - The converter (SFC) implementation has a new parameter to modify the gain of the PI controller for QfU and PfAngle control as well as the synchronous strategy. By default the value is 1. Depending on the controller set points and network configuration, a modified gain, usually smaller than 1, may speed up the simulation significantly.
- OPN-15405: Installer - define automatically the preferences path to OpenTrack.exe
  - The OpenTrack installation path in the OpenPowerNet preferences is set automatically if installed using the new installer.
- OPN-15464: SimS Stabilise messages on scenario kill
  - Hide redundant messages "OpenPowerNet Core killed!" and "OpenPowerNet Analysis killed!" when killing a scenario run.
- OPN-15510: upgrade OpenTrack for OPN 01.13.00
- OPN-15537: GUI Amend XML Snippets
  - Add overhead conductor rail with 80mm<sup>2</sup>, 100mm<sup>2</sup> and 107mm<sup>2</sup> Cu grooved contact wire for AC as well as for DC.
  - Remove temperature variable from DC earth.

#### 4.1.3 Changes

- OPN-15241: ANA Magnetic Field output creation
  - Improved image quality in "shading" diagrams, since text & isolines are now vector-based like in the "iso" diagrams, only colour gradients are bitmap graphic.
  - A larger range of the colourmap is used in "iso" diagrams.
  - Ability to display Chinese characters regardless of system language/locale settings.
  - Output files are larger.
  - SVG vector image output format instead of EMF.
  - Video output is no longer supported.
- OPN-15435: ANA Do not save Excel output if Excel export is not requested and improve usability
  - Do not save Excel output if Excel export is not requested.
  - Improve usability of Selection Editor General Page regarding feedback for the user if certain options are disabled by the current license.
  - Increase file path length limit from 215 to 255 characters, which should be the safe maximum in Windows.

OPN/RN/	 OpenPowerNet	 Institut für Bahntechnik GmbH
Page 8 of 10	Release Notes Version 1.13.0	Issue 2023-12-07

- OPN-15497: Remove tutorial link and zip file from product
  - Remove download link to Tutorial from help system as it is now provided by the installer.
- OPN-15207: PSC Fix crash without error message on long conductor names and update XML project file snippets and wizard
  - Fix crash without error message on long conductor names.
  - Limit length of certain string attributes in the XML project files via XML schema.
  - Require a minimum string length for most string attributes in the XML project files via XML schema.
  - Update XML snippets and wizard for Updated XML Schema and automatically set ReferenceNode.
  - Known issue: Long strings might still be cut off without an error message when inserting them into the database, e.g. the network name when merging networks with long names.

#### 4.1.4 Bugfixes

- OPN-14986: PSC fix slice inserted for ReferenceNode as this could lead to missing Connectors for Leakage definition
  - Fix missing leakage connection if ReferenceNode was defined at a none existing slice.
  - Improve error messages for unavailable Network elements connected to definition of ReferenceNode.
  - Display message PRJ-I-013 (Ignore reference node while merging) only if applicable.
- OPN-15179: OPNCORE update gSoap and fix faulty reconnect after max keep alive
- OPN-15312: SEL fix load simulation is possible with invalid database selection
  - The load button on the General page of the Selection Editor will now be disabled if the selected project file does not exist or the database selection is incomplete.
  - Fix buttons on the General page of the Selection Editor would be enabled for a short time on initialisation.
- OPN-15346: ANA fix JNI memory leak e.g. with long corridors
- OPN-15473: SimS fix OPN Console is not cleared during scenario executions
- OPN-15490: ANA fix TRLPC function
  - Fix error in MATLAB implementation of TRLPC function that could lead to values of the trlpc curve being slightly off if the time signal contained complex values with real part exactly 0.
- OPN-15509: SEL fix crash in jniParsePrjFile
  - An error in jnimodel used by Selection Editor, Analysis and NMMV could lead to a crash of the GUI.
- OPN-15521: ANA Vehicles: fix evaluation bugs
  - Fix signed absolute values in vehicle overviews were identical to the absolute values.
- OPN-15551: ANA fix incomplete lines chart for partially missing data
  - The user could face errors when creating output for lines chart if there was no data in the simulation for some of the selected items, e.g. pantograph voltage when there was no train movement on the particular track. Output creation could

then abort with an error message or the created chart was missing the infrastructure items.

#### 4.1.5 OpenTrack

- The OpenTrack version tested with OpenPowerNet is 1.10.5 (2022-12-27).

### 5 Known restrictions

OpenPowerNet 1.13.0 is tested with OpenTrack version 1.10.5 (2022-12-27) and should only be used with this version.

OpenPowerNet is a single user application. It is not tested to use the same database for multiple users at the same time.

### 6 Version of corresponding documentation

The following table lists the version of the documents related to OpenPowerNet 1.13.0.

Document	Version
Installation Instruction	1.13.0
User Manual	1.13.0

## 7 Known issues

The following table contains all known but unsolved issues.

ID	Summary	Status
371	<p>When using larger time steps other than 1s or 0.5s, OpenTrack sends the requests not for all courses in the same time raster but OpenPowerNet is designed to calculate always in the same time raster.</p> <p>Workaround 1: Always use 1s or 0.5s simulation time steps, which is recommended for best performance and accuracy anyways.</p> <p>Workaround 2: Set all times within OpenTrack in the raster according to the selected simulation time step, e.g. for 3s time step only time hh:mm:00, hh:mm:03, hh:mm:06 .....</p> <p>The simulation will be terminated by OpenPowerNet in case of OpenTrack requests outside of the time raster.</p>	Can't be solved.
n/a	Due to a limitation of the Excel VB interface, sheet names must not use international character sets. Therefore all sheet names will be created in English.	Can't be solved.
n/a	Warning message PRE-W-506 might be displayed on localised systems. This happens due to a limitation of the Excel VB interface, if the printer can not be set correctly. Technical background: As Excel sets the page size of new sheets according to the current printer, a printer with proper setup has to be selected before creating output. This is normally achieved using "Microsoft XPS" printer. If it fails, the user has to take care, that the system default printer is configured as desired. The warning message may be ignored in this case.	Can't be solved.
n/a	Vehicles, charts for all courses with multiple time windows: As data is written to the sheet sorted by engine first and timestep second, the chart series in a subchart can not be limited as easy as if sorted by timestep and therefore will contain time data from other subcharts. The axis scaling will be set correctly though.	Can't be solved.
OPN-13883	While merging with attribute mergeNetwork="false" the model parsing might fail with error message INT-E-353 as the network is still evaluated and checking references to master network.	Open

**END OF DOCUMENT**