

OpenPowerNet

Release Notes Version 1.8.1

Institut für Bahntechnik GmbH
Branch Office Dresden

Document No. OPN/RN/1.8.11.8.1

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| Author | Review | Release |
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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 1.8.1. 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 1.8.1 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 |

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2 List of files on DVD delivery



OPN_InstallationInstruction_1.8.1.pdf
OPN_ModellingCheckList_1.8.1.pdf
OPN_ReleaseNotes_1.8.1.pdf
OPN_UserManual_1.8.0.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.8.1.zip
OpenTrack\OpenTrack.V_1.9.5.2019-05-02.Ph34fD.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions

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3 Main functionality



OpenPowerNet version 1.8.1 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 3rd/4th rail,
 - Monorail systems,
 - Tram networks,
 - Trolleybus networks,
 - Battery buses with charging station.
- AC / 2AC power supply models:
 - Transformer,
 - 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:

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- Feeder current versus time and as TRLPC¹,
- 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 TRLPC¹,
- Voltage versus time and as TRLPC¹,
- Energy overview,
- Vehicle specific charts,
- Vehicle specific overview

¹ The **Time-Rated Load Periods Curve** (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.

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4 Changes since version 1.8.0

4.1 New features

This is a bugfix release, so there are only a few minor new features.

- PSC
 - The internal resistance of the Rectifier model may now be negative.

4.2 Changes to OpenTrack-OpenPowerNet interface

Starting from OpenTrack 1.9.5.2019-04-08, the cosimulation interface has changed slightly. OpenTrack will not wait anymore to receive the ready4Simulation request from OpenPowerNet. If a newer OT is used together with an older OPN, the OT host and port settings in OPN should be changed to use OPN server host and port as destination to prevent error messages. If an older OT is used together with a newer OPN, it might be necessary to press pause and start in the OT simulation controller.

The change should improve stability of the communication during simulation start and makes the reverse connection from OPN to OT obsolete.

OpenPowerNet 1.8.1 is released together with OpenTrack version 1.9.5 (2019-05-02).

4.3 Bugfixes

- PSC
 - The device identification string in some of the console messages could be wrong (e.g. substation/substation/device instead of network/substation/device).
 - Parsing the network model could result in error message INT-E-253 (Node is already used in a SubNet).
- GUI
 - A warning "Commands should really have a category" was displayed in the error log.
- NMMV
 - Network sections with wayside energy storage could be incorrectly displayed as lacking power supply.
 - Position of substation switches was not at the corresponding connector.
 - Busbar order in substation layout was nondeterministic.
 - Busbar position in substation layout was nondeterministic.
 - Device width is now corresponding to string length of device name.
 - Paddings between device/busbar name and edge are now rendered correctly.
- Analysis
 - Vehicles: Create the histogram output pdf files even if only Excel output but no pdf output is selected on the General tab of the selection editor.
 - Vehicle charts: Creation of aggregation charts of type f(t) could fail if a split chart (default split at 3h) did not contain any vehicle data.
 - Creation of output folders could fail if some elements like Network used Unicode characters.
 - Trying to apply text format to Excel cell content with more than 266 characters could result in an endless loop.

- Replace incompatible characters in Excel sheet names. If there should be incompatible characters in course names, these Excel sheets will be named Course_<CourseIdx>_<EngineIdx>.
- Saving Excel files could fail for some localised versions of Excel, particularly with asian character set.
- Substations: If TRLPc chart output was selected for devices but none of the TRLPc types (rms/mean/absmean) was selected, the output creation would fail with an "unhandled error" message.
- Substations: Device aggregation and sum charts were created for substations with mixed device types although there was only 1 device per type.
- Vehicle overview: The maximum loss power of an engine was not calculated if the engine did not have auxiliaries or energy storage. Also changed the description for P_loss and E_loss in the default preset to better separate them.
- Vehicle charts: Selected item on secondary y axis 1 was created on primary y axis if also an item on secondary y axis 2 was selected.
- Vehicle charts: Creation of All_Engines output could fail with error INT-W-522 (Data fields do not match) if one of the engines had a changed mass during its travel and others did not. The Excel datasheet output will always include a column for mass now.

5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.9.5 (2019-05-02) 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 1.8.1.

| Document | Version |
|--------------------------|---------|
| Installation Instruction | 1.8.1 |
| User Manual | 1.8.0 |

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, 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: Use always 1s simulation time steps.</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. |
| 582 | <p>Creation of magnetic field image and vehicle histogram needs the desired character set to be used for output set as system locale as Matlab plot functions do not handle unicode characters.</p> | Can't be solved. |
| n/a | <p>Due to a limitation of the Excel VB interface, placement of the footer logo is limited to particular language editions. If you should face the corresponding warning message, please install the english edition and/or report the displayed code to the developers! The preset attribute "footerLogoFormatCode" under Settings/Excel may be modified to use the proper VB format code.</p> | Can't be solved. |
| n/a | <p>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.</p> | Can't be solved. |
| n/a | <p>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.</p> | Can't be solved. |
| n/a | <p>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.</p> | Can't be solved. |
| 6492 | <p>Calculation of network sections with wayside storage only is currently impossible.</p> | Open |

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