

OpenPowerNet

Release Notes Version 1.5.9

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Document No. OPN/RN/1.5.9

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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 1.5.9. 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 1.5.9 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
GUI	Graphical User Interface
ODBC	Open Database Connectivity
PSC	Power Supply Calculation

2 List of files on DVD delivery

OPN_InstallationInstruction_1.5.9.pdf
 OPN_ReleaseNotes_1.5.9.pdf
 OPN_UserManual_1.5.9.pdf
 OpenPowerNet\my.ini
 OpenPowerNet\createUser.bat
 OpenPowerNet\OpenPowerNet-1.5.9.zip
 OpenTrack\OpenTrack.V_1.8.3.2016-02-05.zip
 ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions
 update\

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3 Main functionality

OpenPowerNet version 1.5.9 has the following main functionality:

- Calculation of AC, 2AC and DC power supply system,
- Calculation of magnetic coupling of conductors is done internally,
- AC / 2AC power supply models:
 - Transformer,
 - Auto transformer,
 - Booster transformer,
- DC power supply models:
 - Rectifier,
 - 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,
- Calculation 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,
- 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:
 - 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

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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- 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 overview

4 Changes since version 1.5.8

- **General:**

- Improve detecting of alternating effort requests, now detected if 4 effort requests alternate.
- Change database version to 19 due to new feature in ATM recording.

- **GUI:**

- bugfix op553: Force module (APserver, ATM, PSC) shutdown/kill when closing GUI.

- **ATM:**

- Add efficiency of transformer and drive (gear, motor, inverter, four quadrant chopper) to enginedata database table. The total efficiency is transformer efficiency * drive efficiency. Transformer efficiency is recorded in % to column "effiTransformer_perc" and drive efficiency in % to "column effiDrive_perc".
- Add transformer and drive efficiency to prepared engine files for "One Engine", "Compare Two Engines", "All Engines", "One Course", "Compare Two Courses".
- bugfix op603: In case of reduced auxiliary and 0km/h was the requested effort returned, this leads with the new OT behaviour of keep requesting effort even once the train stopped due to no tractive effort, to the case of an one time step accelerating then coasting until stand still then one time step accelerating and so on and so on.

- **PSC:**

- bugfix op564: In case of an empty station energy storage the evaluation of available power supply was wrong in case the line feeder from the substation to the line is using a switch.

- **Analysis:**

- Added support for additional system regional settings to Excel output creation.
- Added possibility to use space character as thousands separator in the number format. This may be configured in preset file under Settings/Excel and in Excel under Advanced Options.
- bugfix op582: For the data table of U_Panto = f(s) the course ID and timestep given for a minimum or maximum voltage could be one outside of the time scope with the same position and value.
- Fixed usage of alternative temporary working directory where created output files would be deleted at finish.

- **OpenTrack:**

- Now a train stopped due to not enough tractive effort will keep requesting an effort from OPN. Before the train stopped with the error message "Not enough tractive effort" and did not keep requesting an effort from OPN.
- bugfix: When a course accelerates after a speed limit there was one time step requesting just the driving resistance when OT is running with OPN. Only OT does accelerate immediately once the speed limit is passed. This was causing different

course running times respectively delays when OT is running with OPN even the load flow calculation is turned off.

- bugfix: Wrong effort requests for moving block with acceleration delay is fixed.

5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.8.3 (2016-02-05) 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.

The Engine-File uses the RailML rollingstock schema version 1.03 with OpenPowerNet specific extensions and is therefore not 100% compatible with the mentioned version 1.03.

6 Version of corresponding documentation

The following table lists the version of the documents related to OpenPowerNet 1.5.9.

Document	Version
Installation Instruction	1.5.9
User Manual	1.5.9

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.
458	The information of split, merged and connected courses is not available in OpenPowerNet. Therefore the engine energy storage of an engine will be reset to the initial values even if the new course is connected with the previous course and the two courses represent the same physical train.	Open
582	Creation of magnetic field image needs the desired character set to be used for output set as system locale as Matlab plot functions do not handle unicode characters.	Open