

# OpenPowerNet

## Release Notes Version 1.5.5

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### Document No. OPN/RN/1.5.5

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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 1.5.5. 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 1.5.5 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\_1.5.5.pdf  
 OPN\_ReleaseNotes\_1.5.5.pdf  
 OPN\_UserManual\_1.5.3.pdf  
 OpenPowerNet\my.ini  
 OpenPowerNet\createUser.bat  
 OpenPowerNet\OpenPowerNet-1.5.5.zip  
 OpenTrack\OpenTrack.V\_1.7.6.2015-03-16.zip  
 ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions  
 update\

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### 3 Main functionality

OpenPowerNet version 1.5.5 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 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),

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<sup>1</sup> 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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- 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 overview

#### 4 Changes since version 1.5.4

- **General:**

- OpenTrack update.
- Bugfix 742: Selection Editor crashed some times when unloading if a connector was connected in a loop.
- Bugfix 750: Vehicle analysis did consider the first time step outside the electrical network as a valid time step but this time step should not be considered for vehicle analysis. This bug was only relevant for courses leaving the electrical network model.

- **ATM:**

- The "wrote x engines data to database" (ATM-I-004) message counts now only engines within the electrical network. In 1.5.3/4 also engines outside the electrical network are counted.
- Bugfix 751: The engine current limitation was in some cases not correct in case of restricted current to stabilise ATM-PSC iteration (ATM-I-012).

- **PSC:**

- Now display WARNING message about failed current angle iteration only for iteration steps larger than 90% of maximum allowed ATM - PSC iterations steps.



- **Analysis:**

- Added cache for the preset file(s) for speedup of initialisation.
- Bugfix 755: Selection Editor: The reference of connectors at page "Connectors" was mixed up in case the definition order in the Project-File and the order according the connector name were different. The connector name and curves did not belong to each other in the generated diagrams. Furthermore, for connectors without explicitly given name the automatically created name in the generated diagrams is now based on its nodeFrom position like in the Selection Editor.
- Fixed an error in calculation of minimum RMS values ("U = TRLPC\_min" for page "Voltages") which would lead to higher values in the total chart of simulations with multiple simulation time windows. The single charts per time window were correct though.
- Fixed detection of running simulation before enabling database keys.
- To create output for connectors between lines, both, the voltages and currents are needed to be read from database. If some data is missing, there is a warning message now and output creation is skipped instead of aborting with an exception message.

#### 5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.7.6 (2015-03-16) 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.

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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 1.5.5.

Document	Version
Installation Instruction	1.5.5
User Manual	1.5.3

## 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