

# OpenPowerNet

## Release Notes Version 1.4.3

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

### Document No. OPN/RN/1.4.3

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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 1.4.3. 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 1.4.3 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_1.4.3.pdf
OPN_ReleaseNotes_1.4.3.pdf
OPN_UserManual_1.4.2.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.4.3.zip
OpenTrack\OpenTrack.V_1.7.0.2013-01-14.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions
update\

```

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### 3 Main functionality

OpenPowerNet version 1.4.3 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
  - Energy overview
  - Vehicle specific overview

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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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## 4 Changes since version 1.4.2

- **General:**

- none

- **ATM:**

- Bugfix: Engine current limitation was exceeded in some very rare conditions for very low voltage.

- **PSC:**

- Flush the dump files after each recorded time step to avoid data truncation when unexpected application close.

- **PSC Viewer:**

- Initialise PSC diagram wizard: select first network by default.

- **Excel Analysis:**

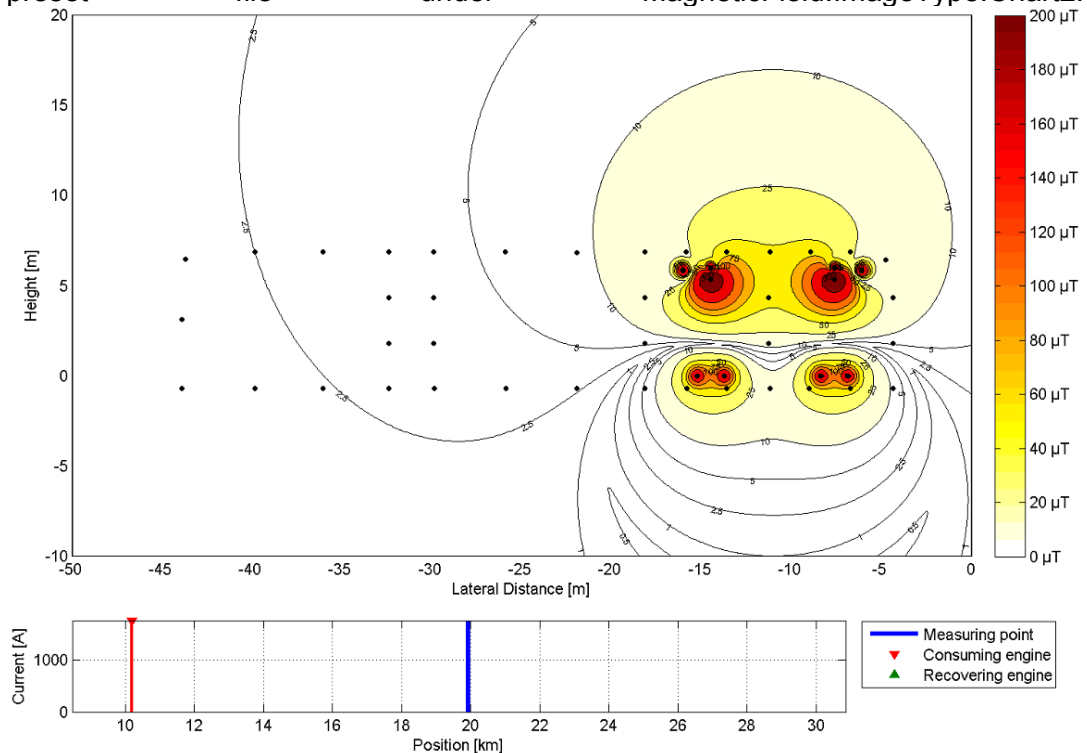
- none

- **Analysis Tool:**

- Added Excel 2013 compatibility.
- Overview tables: Complete makeover.
  - Vehicles overview: Achieved braking energy now is also the mechanical value, includes losses and energy storage. Added losses in vehicle and load balance of energy storage.
  - Devices overview: Added storage load.
  - Substation devices overview: Now includes in/out values in separate rows. Also added  $P_{rms}$  and storage load values.
  - Title is now created as centre header.
  - Moved simulation time window to subtitle.
  - Set font of cells to Arial 12pt.
  - Various performance improvements.
- Presets:
  - It is enough to define only the content different from the default preset in a customised preset file.
  - Added Common.ItemDefs element and ChartType.ItemRef to define common items like chainage items which have to be defined only once.
  - Moved ChartType.System(supply=other) to ChartType.Common. Under ChartType.System now only the elements and attributes different from Common have to be defined.
  - Display calculation date and duration in message console and log file.
  - Improved performance of a particular database query in magnetic field tool and chart creation for lines.
  - Chart for substation device  $P=f(t)$ : Synchronise yAxis and y2Axis setting for |S|, P and Q.
  - Added element "MarkerStyle" to Item and hLine elements. This may be used to define markers that shall be used for the chart series, e.g. for monochrome preset. Multiple definitions per item are possible. Use style "lineMarkers" to activate the

settings. NOTE: When using common item definitions, make full settings to keep the XML structure similar! Define MarkerStyle "none" if needed.

- Renamed attribute "marker" to "label" to prevent mix-up with element "MarkerStyle".
- Inline measurement:
  - Creating magnetic field output videos in resolution 1280x720.
  - Improved quality of magnetic field output images in iso mode: PDF file creation is completely vector based. Vector format is not convenient for shading images (normal mode) as it leads to very large files.
  - Added position plot to magnetic field image which shows the measuring point and engine positions at the particular timestep for the whole line. Can be configured in preset file under MagneticField.ImageType.Chart2.



- Settings file is now located in user's appdata directory instead of documents directory.

## 5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.7.0 (2013-01-14) 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 1.4.3.

Document	Version
Installation Instruction	1.4.3
User Manual	1.4.2

## 7 Known issues

The following table contains all known but unsolved bugs.

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	<p>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.</p>	Open