Institut für Bahntechnik GmbH

OpenPowerNet

Release Notes Version 1.10.0

Institut für Bahntechnik GmbH
Branch Office Dresden

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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 1.10.0. 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 1.10.0 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

2 List of files on DVD delivery

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OPN_InstallationInstruction_1.10.0.pdf
OPN_ModellingCheckList_1.9.2.pdf
OPN_ReleaseNotes_1.10.0.pdf
OPN_UserManual_1.10.0.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.10.0.zip
OpenTrack\OpenTrack.V_1.10.3.2021-07-30.Ta18kN.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions
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3 Main functionality

OpenPowerNet version 1.10.0 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 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:

        - Feeder current versus time and as TRLPC[1],
        - 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[1],
    - Voltage versus time and as TRLPC[1],
    - Energy overview,
    - Vehicle specific charts,
    - Vehicle specific overview

[1] 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.

4 Changes

4.1 Version 1.10.0 vs. 1.9.2

4.1.1 Improved user experience

- General
  - Add **library for network model elements**, like conductors, connectors, substations and transformers. For details, please see User Manual 1.10.0 chapter 4.4.10.
  - Add update site to EGit, this feature provides the git integration into OpenPowerNet.
- Analysis
  - Substation diagrams can now be generated for a longer duration by repetition of the simulated time. This is in particular useful for cyclic timetables to generate substation diagrams for a multiple of a user defined time window. For details of the **Time Window Repetition** see User Manual 1.10.0 chapter 4.6.1.4.

4.1.2 Changes

- Database
  - The Database version has increased to version 24 due to changes in table enginedata by adding speed at the end of the timestep, mass including rotating mass and train resistance. Simulations of previous OpenPowerNet versions cannot be analysed with this OpenPowerNet version and vice versa.

4.1.3 Bugfixes

- General
  - Overloaded time steps with very low panto voltage are now triggering a failed iteration.
  - Fix Effort requests for some special time steps, e.g. start of braking, start of constant speed.
  - Fix error in NMMV and Selection Editor in case of a Line without conductors.
- Analysis
  - Fix missing data at minimum pantograph voltage diagram.
  - Fix where the analysis detected a broken chainage where no broken chainage was modelled. This happened sometimes just before the course stopped.
  - Fix a rounding issue when calculating the corridor position, this could trigger a broken chainage visualisation at the diagrams.

4.1.4 OpenTrack

- Update to 1.10.3 (2021-07-30)
  - This version cannot be used with older OpenPowerNet due to changes at the communication interface between OpenTrack and OpenPowerNet.

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5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.10.3 (2021-07-30) 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 1.10.0.

Document	Version
Installation Instruction	1.10.0
User Manual	1.10.0

7 Known issues

The following table contains all known but unsolved issues.

ID	Summary	Status
371	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. Workaround 1: Always use 1s or 0.5s simulation time steps, which is recommended for best performance and accuracy anyways. 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 ….. The simulation will be terminated by OpenPowerNet in case of OpenTrack requests outside of the time raster.	Can't be solved.
582	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.	Can't be solved.
n/a	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.	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

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