OpenPowerNet

Release Notes Version 1.5.7

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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 1.5.7. 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 1.5.7 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_1.5.7.pdf
OPN_ReleaseNotes_1.5.7.pdf
OPN_UserManual_1.5.7.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.5.7.zip
OpenTrack\OpenTrack.V_1.8.1.2015-07-27.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions
update\
```

3   Main functionality

OpenPowerNet version 1.5.7 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[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),

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[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.

- ○ Conductor and connector current versus time and as TRLPC[1]
- ○ Voltage versus time and as TRLPC[1]
- ○ Energy overview
- ○ Vehicle specific overview

4 Changes since version 1.5.6

- **General:**
  - bugfixing release
- **ATM:**
  - bugfix: For larger engine energy storages the state determination was not correct.
  - bugfix: The load power of the engine energy storage could be too high in some cases.
- **PSC:**
  - Add optional property secondary voltage phase shift to TwoWindingTransformer configuration, attribute secondaryVoltagePhaseShift_degree.
  - bugfix: Added optional attributes "lossVoltageDrop_kV" and "lossResistance_Ohm" to the rectifier model to calculate the losses according to IEC/TR 60146-1-2. The previous calculation of the rectifier losses were not correct and a way too high as previously the voltage drop at the clamps and current was used to calculate the losses.
  - bugfix: Storage Saver could end up in a never ending loop in some rare circumstances.
- **Analysis:**
  - bugfix: Fixed creation of VLD device specific output.
  - bugfix: Fixed vehicle overview: Engines with auxiliaries in multiple propulsion systems would lead to an error.
  - bugfix: Fixed vehicle overview: In case there was a mix of engines with and without auxiliaries and/or energy storage, the corresponding "total" value of all courses was too small.

5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.8.1 (2015-07-27) 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 1.5.7.

Document	Version
Installation Instruction	1.5.7
User Manual	1.5.7

7 Known issues

The following table contains all known but unsolved issues.

ID	Summary	Status
371	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. Workaround 1: Use always 1s simulation time steps. 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.
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