

OpenPowerNet

Release Notes Version 1.12.0

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 1.12.0. 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 1.12.0 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

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2 List of files on DVD delivery



OPN_InstallationInstruction_1.12.0.pdf
OPN_ModellingCheckList_1.11.0.pdf
OPN_ReleaseNotes_1.12.0.pdf
OPN_UserManual_1.12.0.pdf
OpenPowerNet\my.ini
OpenPowerNet\createUser.bat
OpenPowerNet\OpenPowerNet-1.12.0.zip
OpenTrack\OpenTrack.V_1.10.4.2021-12-28.Ac58pL.zip
ThirdPartyPrograms\ required by OpenPowerNet, see Installation Instructions

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3 Main functionality



OpenPowerNet version 1.12.0 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,
 - Static Frequency 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:

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- 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,
- 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 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.

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4 Changes



4.1 Version 1.12.0 vs. 1.11.00

4.1.1 New Features

- OPN-14739: Make SOAP control port configurable in GUI
 - The control port used to make internal connections from the GUI to the simulation server may now be changed by the user in the Server Preferences, if needed.
- OPN-14830: SimS Detect source file changes
 - Changes in scenario input files are now detected and displayed on the Run Control page. Relative paths of input files and their checksums are persisted in the file <baseDir>/SimulationSuite/Scenarios/.inputFileGuard.
- OPN-14927: Add propulsion system DC 1000V
 - Support propulsion system "DC 1000V".
 - Fix a bug in ATM that would prevent using propulsion system "other".
- OPN-15057: SimS Remake Single Scenario
 - Users can now remake individual scenarios of which the input files have changed by clicking the input file check button for the scenario.
 - Add an icon to the button for remake changes scenario directories to improve user experience.
- OPN-15142: ANA Support Excel country code 34 for Spain
 - Excel country code 34 for Spain is now supported by Analysis.
- OPN-15296: ANA Support Excel country code 420 for Czech Republic
 - Excel country code 420 for Czech Republic is now supported by Analysis.

4.1.2 Improvements

- OPN-14963: SimS Implement optional fast scenario stop
 - It is now possible to "kill" (instead of just "cancelling") a running or busy scenario without having to wait for time-consuming database processes at the end of a simulation or for creation of analysis output files. This might leave a corrupt simulation database or Excel processes in the background though.
 - Furthermore, the status messages for the scenario run are improved.
 - The number of errors and warnings will not be displayed if the simulation is "killed" in order to prevent confusion.
- OPN-15011: SimS Improve path definitions in AutomationConfig
 - Paths inside the AutomationConfig.sims are now stored relative to the file instead of relative to the project, which will allow more flexibility. A migration of the file will be necessary.
 - The path of the project on disk will not be displayed on the first page anymore.
 - The migration of the AutomationConfig.sims file was improved to prevent damage to the content if something fails.
- OPN-15031: SimS List invalid references in OtPrefs file
 - If some of the files referenced in the OtPrefs file are inaccessible, there will be a more detailed tooltip now naming these files.
 - If all the files referenced in the OtPrefs file are inaccessible, this might be caused by an invalid path of at least one of the reference definitions, which is difficult to detect.



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In that case, the user will get a dedicated tooltip that requests them to manually ensure the consistency of all file paths in the OtPrefs file.

- OPN-15058: SimS Copy designation with scenario
 - Designation will be copied now when duplicating a scenario configuration.
- OPN-15093: Tutorial is supported by Simulation Suite
 - The Tutorial now comes with a pre-configured Automation-Config.sims file allowing the user to run all or individual tutorials out of the box.
- OPN-15120: SimS Improve Handling Of Inconsistencies In Orchestrated Scenarios
 - It is now possible to work with orchestrated scenarios even if their input files have been deleted. Their scenario directories will be kept unchanged unless the scenario definitions like project name, report ID or VID have changed. Furthermore, inconsistent scenarios will not block working with the remaining scenarios.
- OPN-15257: SimS Unify AutomationConfig name in GUI
 - Improve consistency of Automation Config file name, text labels and page names of the editor.
- OPN-15279: SimS Fix configuration of OT reference paths for moved project folder
 - The mandatory remake after moving an orchestrated SimS project could fail if the files were inaccessible at their previous location. When the files were still accessible at their previous location, the user would need to trigger the remake himself, but that succeeded and used the files from the new location. With the overall improvements, a remake should not be necessary now anyways, and the OtPrefs file in the scenario directory will be silently adjusted when opening the RunControl page if it was clean before.

4.1.3 Changes



- OPN-14069: GUI Deactivate Eclipse in-place system editors
 - When opening files from within OpenPowerNet GUI, that require an external editor, like Excel or PDF files, these files will now be opened outside of the GUI by default instead of squeezing them into a tab. This will provide more screen real estate for those files. The old behaviour may be activated by enabling the option Preferences/General/Editors/Allow in-place system editors, but this is unsupported due to previous problems.
- OPN-14631: SimS Apply preference changes
 - Changes to OPN Preferences will be applied to the next scenario that is being started.
- OPN-14796: ApServer Improve Pmech calculation with increased travel time
 - Calculate and limit traction power using average speed during the timestep instead of speed at the beginning of the timestep. This improves calculation of energy values as at the beginning of the timestep, the traction power could be too low and the braking power too high. Travel times might be slightly increased, but usually not by more than 1 timestep per operational cycle.
 - Increase database version to 25 as the implementation changes affect both simulation core and analysis.
- OPN-15327: GUI Remove tutorial exports from product
 - The tutorial zip file does not include Analysis output anymore and the database export zip file is not available anymore as the effort to produce this data is lower now by using SimulationSuite.

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- OPN-15063: SimS Prevent multiple analysis selection files with identical name
 - The selection of multiple analysis selection files with the same name is now prevented in the "Co-Simulation Scenarios" page of the SimS editor. A warning tool tip is displayed in such a case.
- OPN-15125: SimS Prevent using hash character for PID
 - Prevent using hash character (#) for PID, as it would lead to problems with the path of the scenario directory. The following characters are allowed now: a-z A-Z 0-9 .,-_+
 - Furthermore, input validation and consistency check for other parts of the scenario directory were improved.
- OPN-15284: SimS Fix editor blocked by missing ODBC DSN
 - Show dedicated consistency check errors if the selected ODBC DSN is unavailable (e.g. when loading an existing SimS file) or not a single ODBC DSN is available (e.g. when creating a new SimS file).
- OPN-15243: Update MariaDB from 5.5.30
 - OPN is delivered with MariaDB 10.5.16 instead of 5.5.30. An updated my.ini file is needed, see document "Installation Instruction" for the upgrade instructions.

4.1.4 Bugfixes

- OPN-14521: GUI Fix typos on help page
 - Fix some typos on the help page.
- OPN-14497: PSC Fix DC simulation has imaginary part
 - Fix error INT-E-085 about unexpected imaginary part could occur for DC network calculation.
- OPN-14812: engine controlled braking voltage level
 - Improve U_source engine propulsion recovering mode. Recovering engine will now define the voltage level instead that the no-load voltage of the substation is assumed. The effect is to have a higher voltage in case recovering engines are able to supply the whole consumed power by other engines, in particular if a recovery current limit is defined.
- OPN-14920: ATM Fix application of min and max speed for ocs charge
 - Fix application of engine storage parameters minSpeedOcsCharge_km_h and maxSpeedOcsCharge_km_h: Speed during the whole timestep will be considered now instead of speed at the beginning of the timestep only.
- OPN-14964: SimS Improve OpnRunner error handling during finish simulation
 - Allow the produced data of the cosimulation to be written to database instead of killing the process after some time.
 - Unify handling of stop requests on a simulation that is still running or already aborting due to an error.
 - The new timeout before kill is 6h for manual or error driven stop requests for the same reason.
 - Fix scenario cancel request could get lost during simulation start.
- OPN-14971: SimS Fix RunControl headline greyed out
 - The status headline on RunControl page could appear greyed out in some cases.
- OPN-15001: Fix Connected Courses With Energy Storage

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- If a course connection, that shall represent a physical train, is modelled without a wait time in OT, this connection might fail in OPN due interface issues. It is required to model a wait time of at least 1 timestep in OT. When working with connections, the user should observe the warning messages generated by the OPN server: A warning about circulation courses stating "creating a new train" means that both engines might demand power at the same time, which is not intended. Furthermore, the final SoC of engine energy storages will not be transferred to the new course.
- OPN-15069: SimS Improve remake of existing scenario directory
 - Prevent rare events that could change existing files in scenarios without user interaction. Furthermore, there were several fixes to the different remake actions.
- OPN-15090: SimS Assure no Excel instances on AnaRunner stop
 - Cancelling a running Analysis process or a SimS Scenario Run during AnalysisStep could leave some Excel instances open in the background which might lock the output folder. The Analysis output creation will be aborted clean now at a suitable stage.
- OPN-15091: SimS improve failed remake feedback
 - Fix lock button being kept inactive if remaking a scenario fails.
- OPN-15112: SimS Improve consistency check for preferences
 - The SimS editor now prevents switching to the RunControl page if OpenTrack preferences are empty.
- OPN-15160: Fix ODBC Connection Error
 - Fix opncore may hang if ODBC connection fails. Also improve the error message for that case, which applies to jnimodel used for Analysis as well.
- OPN-15162: GUI Fix loading failed simulation with special character into Selection Editor
 - Fix issue in SEL-Editor when loading model in online mode from a failed simulation using database schema with names containing special characters like ".", "#", "-".
- OPN-15164: ATM Fix reduced effort in rare occasions reaching more than 90% of allowed iterations steps
 - In rare cases when the iteration reached more than 90% of the allowed iterations, at engines with onboard energy storage charging from OCS, the effort was sometimes reduced instead of reducing the charging power. Now, the charging power is reduced in favour over having an achieved effort.
- OPN-15183: SimS Increase Analysis timeout
 - Increase Analysis timeout for SimulationSuite execution from 15 Minutes to 6 hours to allow analysis with very long running single steps.
- OPN-15191: SimS Fix scenario remake does not reset status
 - Fix status was not reset on remake in some cases so that it would look like scenarios already ran although the content of their scenario folder was brand new.
 - Improve migration of projects created with OPN 01.11.00, so that the status of the scenarios is kept, and the user is not forced to do a remake. A remake will be necessary though if the project folder is moved to another path, but this is not connected to migration.
- OPN-15192: SimS Fix remake buttons reenabled too early
 - The Lock button and the buttons "Reset status" and "Remake all scenario directories" on Run Control page were reactivated too early during a remake, which would lead to errors if the user clicked on them while the job was not finished.

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- OPN-15193: SimS Fix AnalysisStep ModuleID
 - Fixed SimS AnalysisStep being named CoSimStep if there are multiple selection files for a scenario.
- OPN-15195: SimS Treat simulation abort as error
 - If a simulation is aborted, there will always be an error now to ensure that such scenario run is treated as failed in SimulationSuite.
- OPN-15198: SimS Fix UTF8 characters formatting of console output
 - Fix UTF8 character formatting of SimulationSuite console and log file output
- OPN-15224: SimS Fix cancelled remake dialog leads to remake
 - Fix cancelling the remake confirmation dialog for changed scenario directories using escape key or close button would lead to an unwanted remake.
- OPN-15246: ANA Sort chart series for inline current
 - Fix chart series for Inline Conductor Current were unsorted and could therefore be drawn in different order on different machines.
 - Fix chart series for Inline Conductor Current could skip colour definitions from the preset depending on the selection.
- OPN-15264: ANA Fix slow database query for engine energy storage
 - Fix the slow database query for engine energy storage.
- OPN-15269: SimS Fix UTF8 file handling in XmlVariator
 - Fix XmlVariator would throw an exception about UTF-8 sequence for OPN Project-File with UTF-8 characters in certain attributes.
- OPN-15276: SimS Stabilise Remake All Function
 - Fixed an issue that could lead to changed or missing files being reported by mistake right after a remake.
- OPN-15289: SimS Fix failing remake individual scenario forces remake all
 - Fix an error were failing to delete a scenario directory would leave all scenarios unusable.
- OPN-15295: ANA Fix output creation of Lines ICondSum after ILeakage
 - Output creation for Line charts of type "I_sum = f(s)" would fail with error INT-E-502 "pItemName must be a valid item field name of the preset!" if they were created right after "I_Leakage = f(s)".
- OPN-15302: SimS Prevent error from CoSimStep after actual finish
 - In some cases, an error message for a scenario run could be displayed, stating that a message with ID OPN-I-005 could not be read, although the scenario finished successfully.
- OPN-15310: SimS Fix error messages in CheckDatabaseStep
 - Improve error messages in SimS database checker that runs after each co-simulation.
- OPN-15320: SimS remake fails after source file reference change
 - Fix remake fails if referenced file name is changed inside the project file.
 - Skip remakes if scenarios are not locked.

4.1.5 OpenTrack

- Version not updated, is still 1.10.4 (2021-12-28).

5 Known restrictions

OpenPowerNet is tested with OpenTrack version 1.10.4 (2021-12-28) 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 1.12.0.

Document	Version
Installation Instruction	1.12.0
User Manual	1.12.0

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 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.</p> <p>Workaround 1: Always use 1s or 0.5s simulation time steps, which is recommended for best performance and accuracy anyways.</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.
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

END OF DOCUMENT