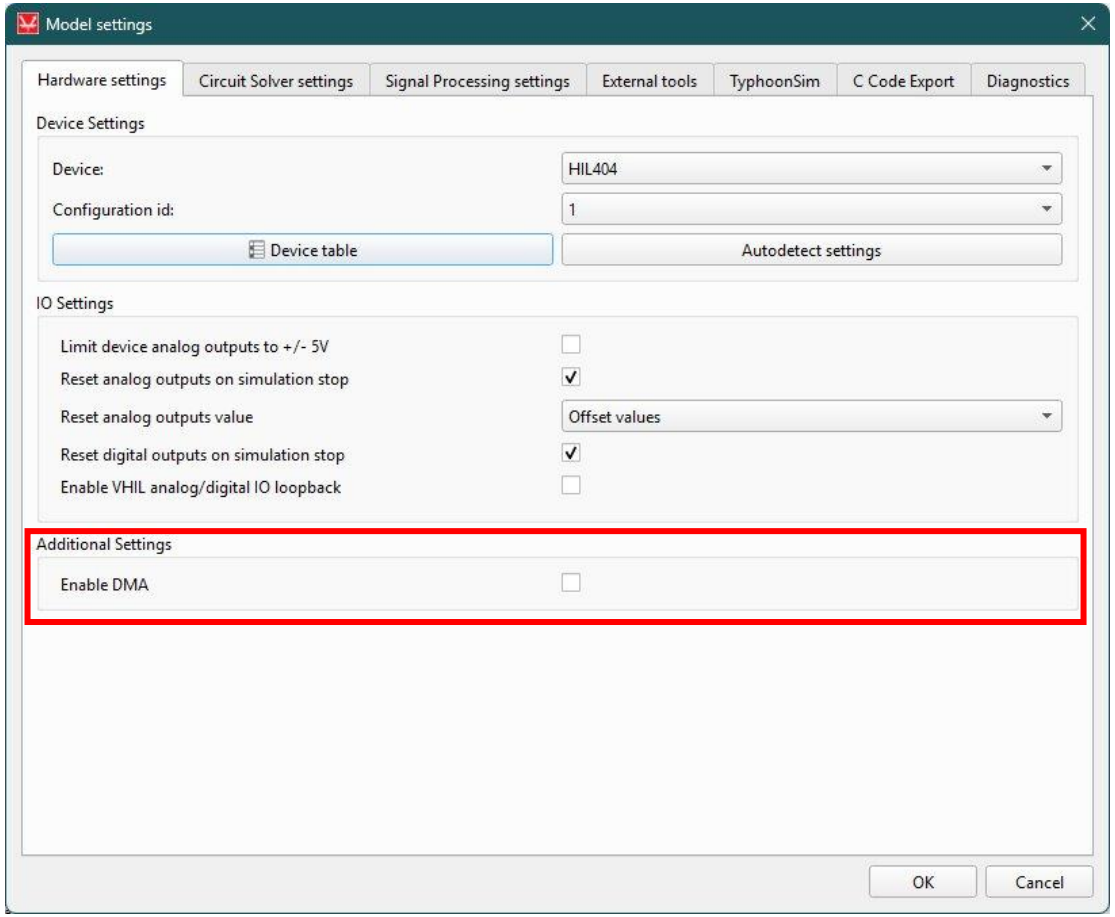
2025.4 Software Release Highlights

- **Performance upgrades**
- **E-Mobility Communication updates**
- **Grid Modernization Communication updates**
- **Additional features**
  - Additional info in Comments
  - Override switches from Output Settings
- **TyphoonSim updates**

Performance upgrades

Direct Memory Access (DMA) support

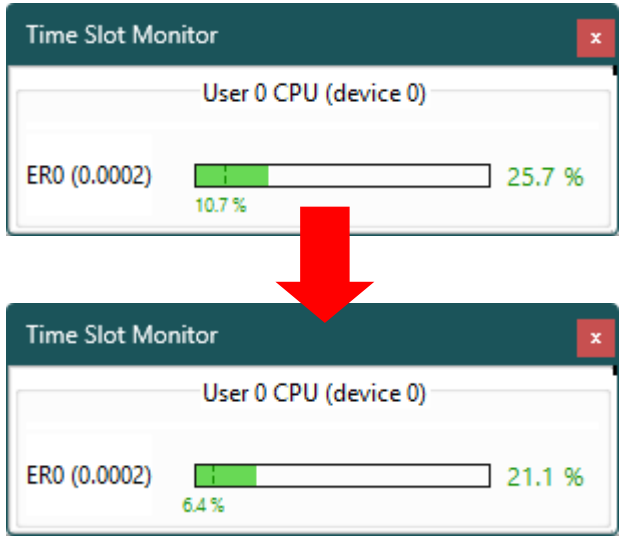
- Added support for hardware assisted CPU-FPGA data transfer on 4th generation devices
  - Reduces CPU IO workload
- Custom-built DMA controller for optimal performance
- Which components benefit?
  - Probes / Digital probes
  - Voltage & current measurements with signal outputs
  - Signal controlled sources
  - Machines / Converters with losses calculation
  - Device transition
  - SFP Simulation Link
- Enable DMA in the Model Settings window



Performance upgrades

Direct Memory Access (DMA) support

- DMA found to reduce CPU resource demand in the following examples:*
  - ti grid-connected converter pq **~17%**
  - indm losses calculation and thermal model **~13%**
  - ieee 13 node with substation **~17%**
  - battery management system **~19%**



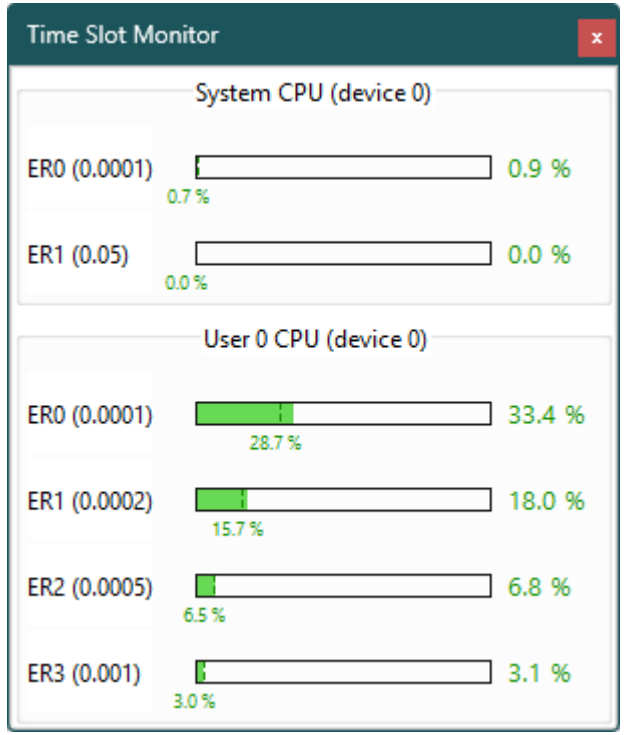
- Up to 300% lower CPU demand for extremely IO Intensive models
- IO operations are now less time-shifted

* Tested for HIL404, fastest rate, worst case

Performance upgrades

Upgraded CPU Scheduler and code optimization – all devices

- New CPU Scheduler ensures deterministic task executions with any number of execution rates
  - Priority before: ER0 > ER1 == ER2 == ER3
  - Priority now: ER0 > ER1 > ER2 > ER3
- Code optimization brings an additional 1-2% reduction in CPU resource demand

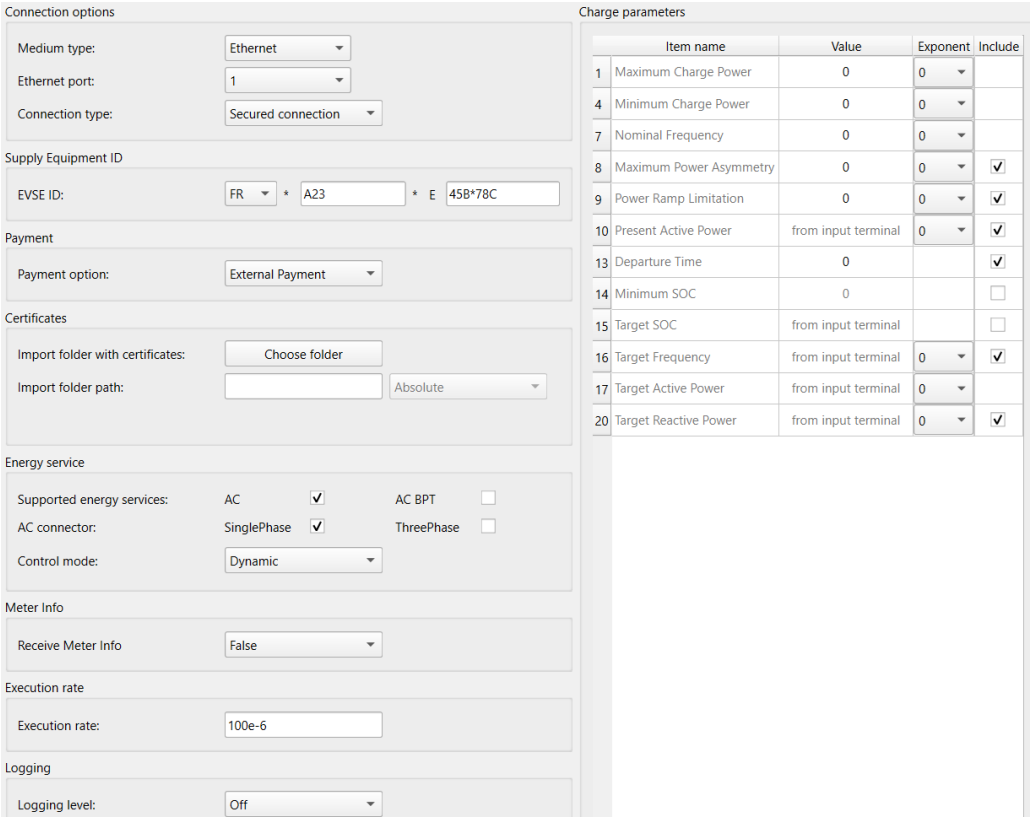


E-Mobility Communication updates

ISO 15118-20 SECC AC support

- ISO 15118-20 SECC component added:
  - Previously, only EV side was represented in Typhoon
  - New component adds support for the SE side of the protocol
- Key features:
  - Communication:
    - Ethernet
    - PLC (Power Line Communication)
  - Payment types:
    - External Payment
    - Contract Payment (Plug & Charge)
  - Supported energy services:
    - AC (1ph & 3ph)
    - AC BPT (1ph & 3ph)

ISO 15118-20 SECC1



E-Mobility Communication updates

DIN SPEC 70121 support

- DIN SPEC 70121 is based on an early unpublished version of the ISO 15118-2 Protocol and defines digital communication between an electric vehicle and a DC charging station

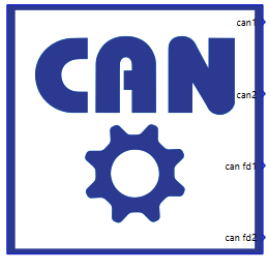
- DIN 70121 EVCC component added:
  - EV side of the protocol is now implemented
  - Represents the communication interface, and not the controller itself

DIN 70121 EVCC1

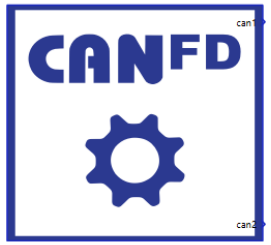
E-Mobility Communication updates

CAN Bus/CAN FD Setup component updates

- Status output ports added to indicate communication errors and certain buffer states (such as overflow)
  - **CAN Bus Setup**: *can fd1* and *can fd2*, indicating status of CAN FD1 and CAN FD2 controllers
  - **CAN FD Setup:** *can1* and *can2*, indicating status of CAN1 and CAN2 controllers



CAN Bus Setup1



CAN FD Setup1

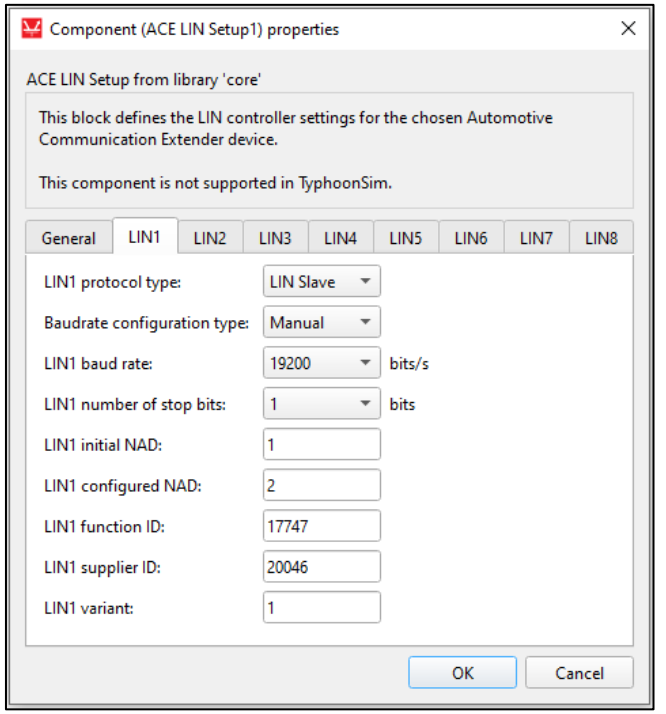
XCP over Ethernet support

- Previously, XCP over CAN was supported
- Now, XCP can now communicate with ECUs over Ethernet as well
- HIL SCADA implementation

E-Mobility Communication updates

ACE updates: LIN Bus Protocol

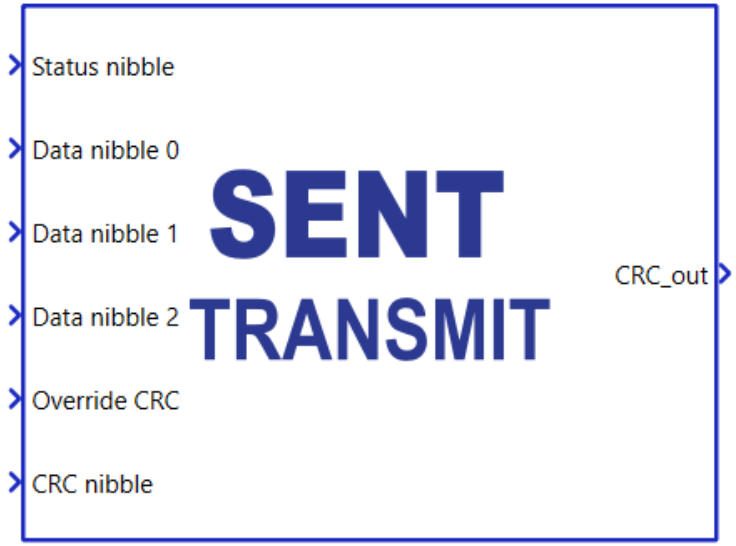
- LIN (Local Interconnect Network) is a communication protocol used for connecting low-speed electronic components and sensors within a vehicle, designed as a cost-effective and simple alternative to CAN
- Two new components:
  - **ACE LIN Setup component**, used for configuring LIN controllers located on the Automotive Communication Extender (ACE)
    - Up to 8 LIN controllers supported per ACE device
  - **LIN Slave component,** used to specify the type and format of a single LIN Frame to be published or subscribed to
- Supported on 4th generation devices, together with the ACE board



E-Mobility Communication updates

ACE updates: SENT Protocol

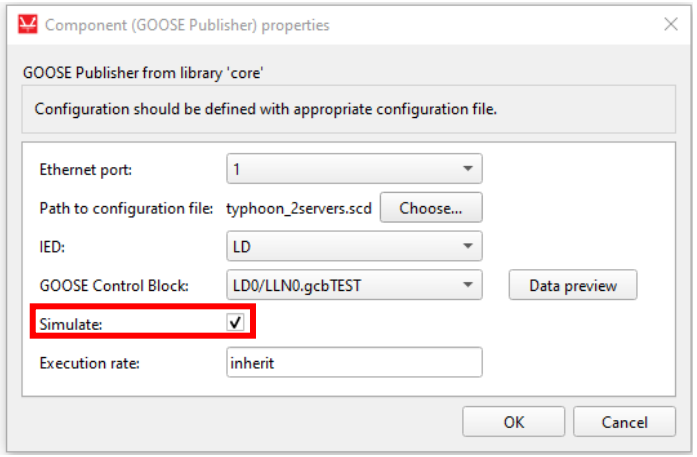
- Single Edge Nibble Transmission (SENT) protocol is a unidirectional, single-wire communication method defined by the SAE J2716 standard
- Two new components:
  - **ACE SENT setup component**, used for selecting the ACE device ID for SENT communication and the HIL Ethernet port
  - **The SENT Transmit component**, used for configuring SENT Transmit parameters
- SENT Transmit in Typhoon HIL is handled via the ACE board:
  - The HIL device connects over Ethernet, while the protocol runs on the ACE's GPIO pins
  - Up to 8 SENT Transmit controllers available per ACE device
- Supported on 4th generation devices, together with the ACE board



Grid Modernization Communication updates

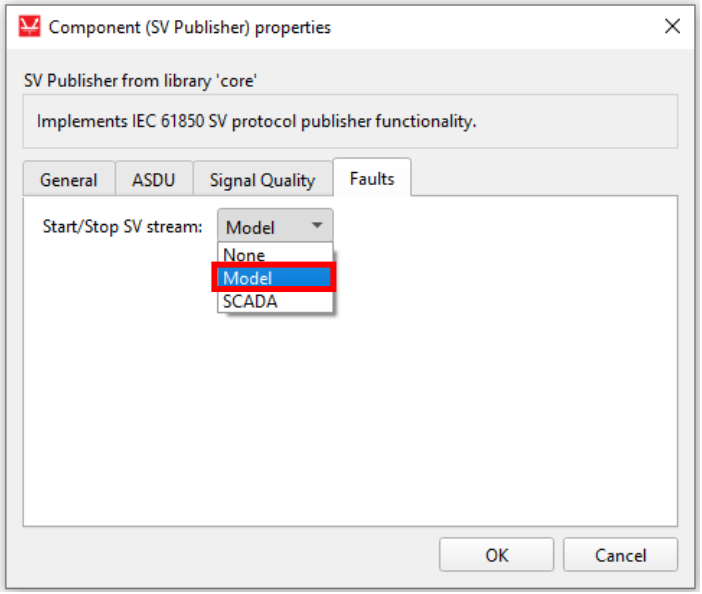
Added simulation bit to IEC 68150 GOOSE

- Added a flag to indicate whether the Publisher message is sent by a test device (HIL) or a real device
- Can be changed during simulation runtime
- This flag helps the Subscriber distinguish between real and simulated test values



Manipulations of SV streams for IEC 61850 & IEC 61869

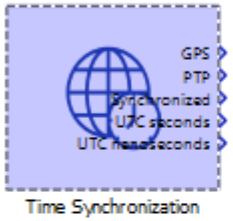
- Ability to Start/Stop continuous SV stream in IEC 61850 & IEC 61869
- Control options:
  - Model
  - SCADA

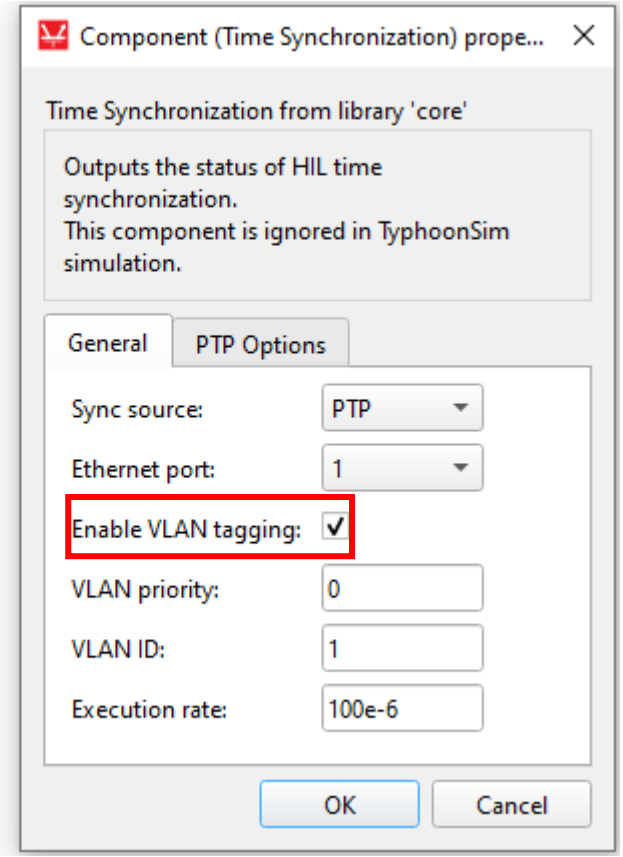


Grid Modernization Communication updates

VLAN 802.1Q tagged messages support

- Now, communication protocols can be split across multiple virtual networks on a single physical network
- Define priority of VLAN tagged PTP messages
- Define VLAN identifier, allowing you to distinguish other VLANs within the same network
- Supported on:
  - IEC 61850 & IEC 61869 SV
  - Time Synchronization (PTP)

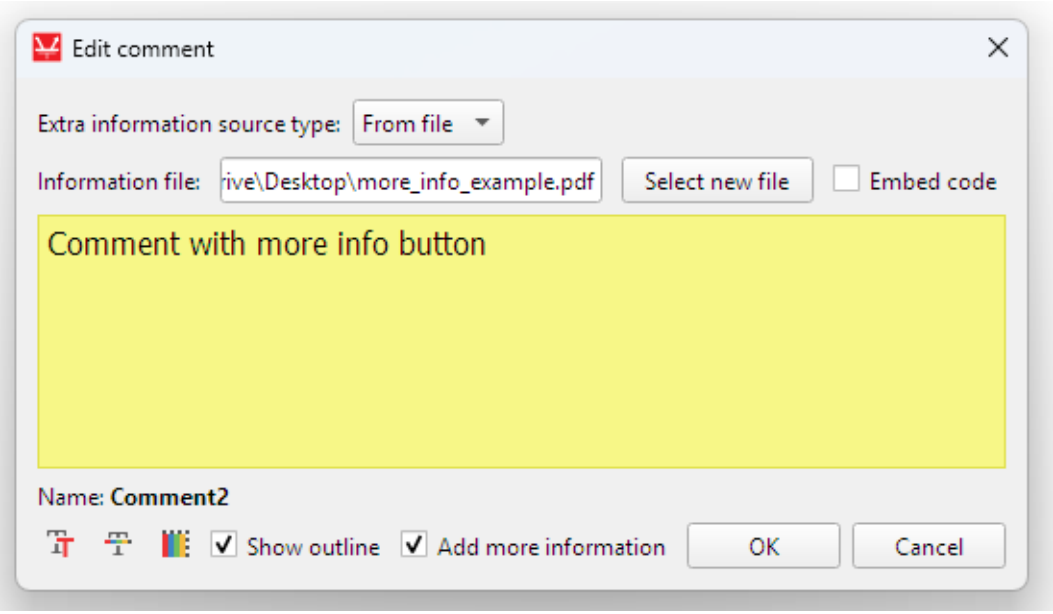




Additional features

Additional info in Comments

- Comments can now provide additional information and figures without occupying more schematic area
  - From file: PDF and HTML files
  - From text: plain text, when figures are not necessary
  - Embed into .tse/.tlib or save a relative path
- Adds a button beside the comment that, when clicked, displays a viewer for the additional file or text

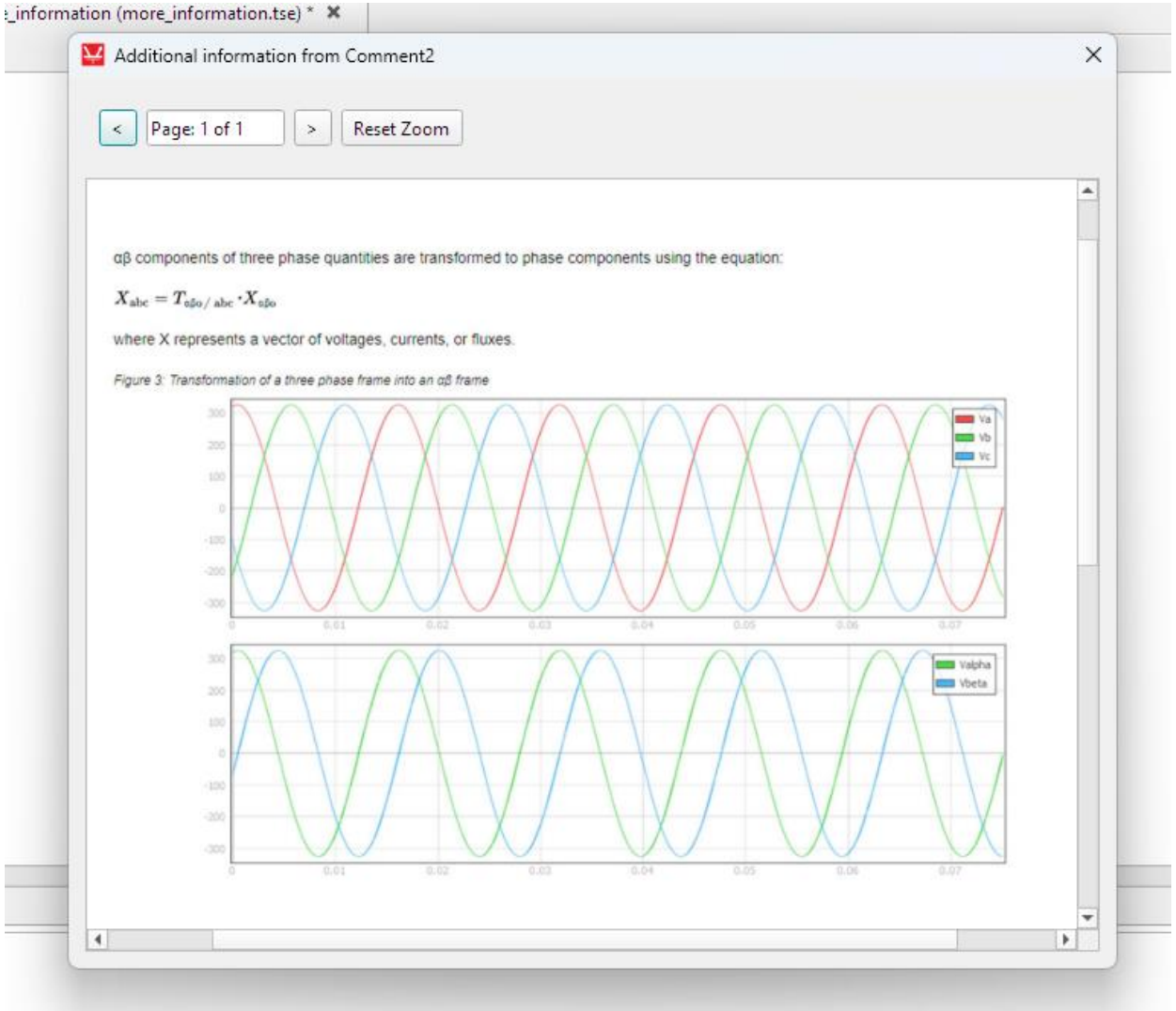


Standard comment

Comment with additional information

Additional features

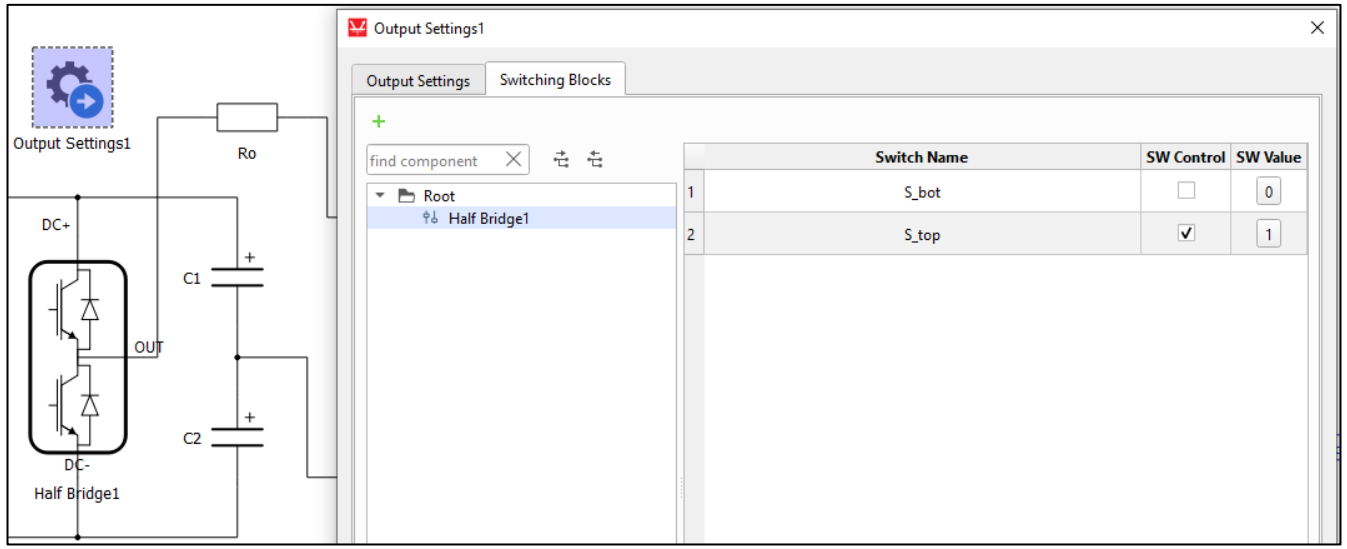
Additional info in Comments - Pop-up content viewer

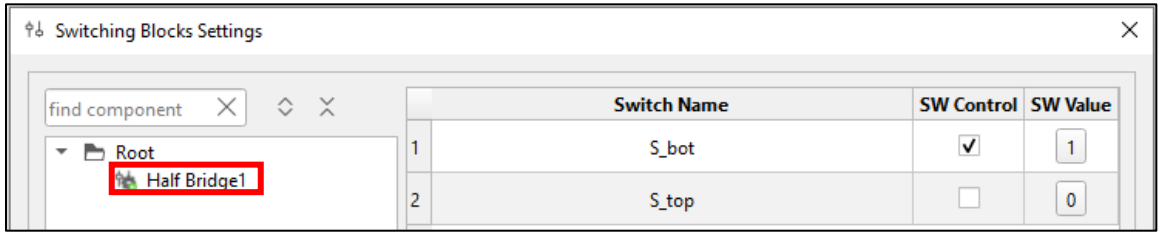


Additional features

Override switches from Output Settings

- Software override of converter switches is now possible from Schematic Editor
- Icon indicating that the switch has been overridden from Schematic Editor will be displayed in Switching Blocks Settings of HIL SCADA
- Converter blocks supported

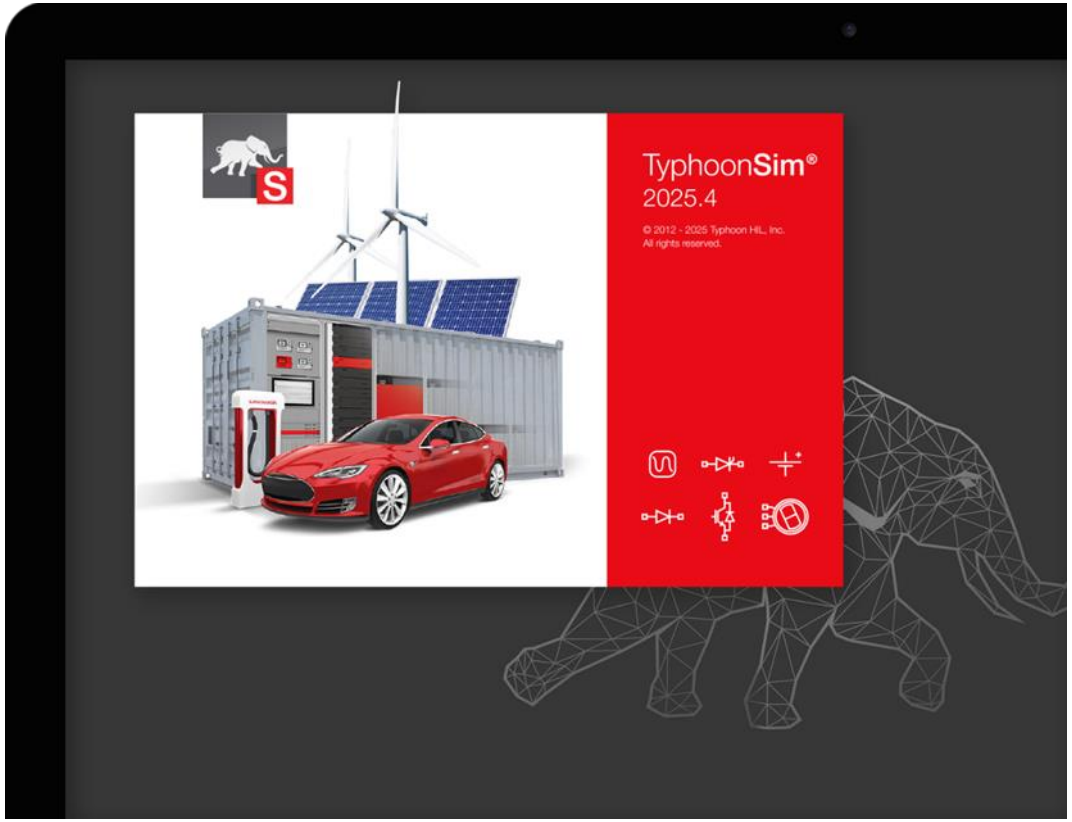




TyphoonSim updates

Extended library support

- Time for simulation preparation reduced by 75% on average
- Probes now support vectorized input
- 4 new converters added:
  - ANPC Flying Capacitor Inverter 7 Level Leg
  - ANPC Flying Capacitor Inverter 9 Level Leg
  - Seven Level Flying Capacitor Inverter Leg
  - Tapped Inductor Buck-Boost
- Machine enhancements:
  - Dynamic resistors support for 3ph Squirrel Cage IM
  - Fault simulation support for 3ph Squirrel Cage IM
  - Dynamic permanent flux support for 3ph PMSM
  - Non-linear support for 3ph PM assisted Synchronous Reluctance Machine



Thank you for your attention!