



WHAT'S NEW



AGENDA

WHAT'S NEW

- Software
- Component Models
- Hardware
- Upcoming Developments

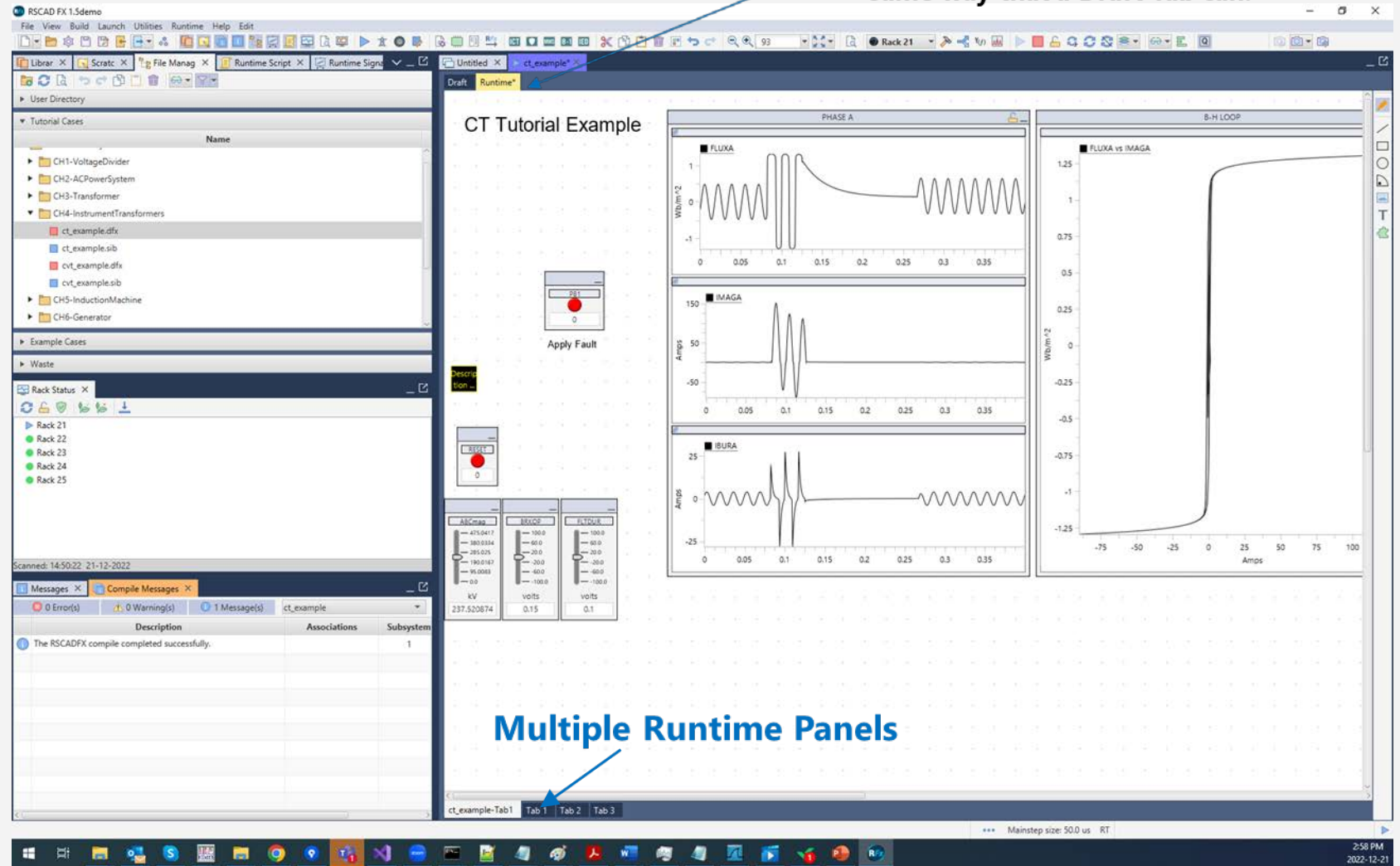
RSCADFX2.0

RunTime FX

- Released April 2023
- Modern look, feel, functionality
- Significant improvement for manipulating and compiling large simulation cases

Runtime Module is now a tab under the case tab

- Tab can be docked/undocked in the same way that a Draft Tab can.



RSCADFX2.0

Draft – RunTime Layers

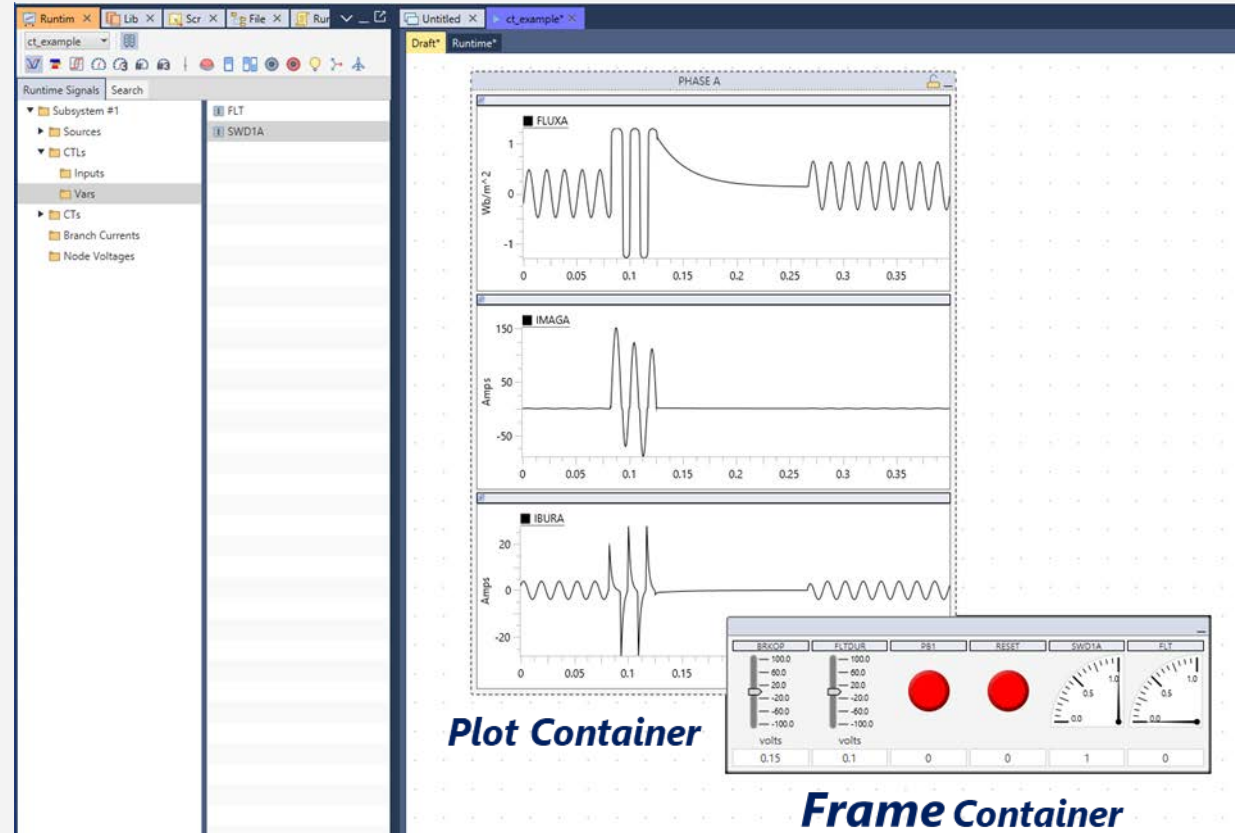
The screenshot displays the RSCAD FX 1.5a software interface, divided into several functional areas:

- Left Panel (Runtime Signals):** A tree view showing the project hierarchy. Under 'Machines', several induction motor models are listed: IND2A, IND2B, IND2C, IND2P, IND2Q, IND2TE, and IND2ZW.
- Bottom-Left Panel (Rack Status):** A status bar for Rack 22, showing it is active (green) and listing other racks (21, 23, 24, 25).
- Bottom-Left Panel (Messages):** A log of runtime messages, including 'Run Started Successfully', 'Starting data collection for plot: 150000 points', and 'Completed the run'.
- Main Canvas (Draft/RunTime):** A detailed power system diagram. It features a 10kV 13.8kV Distribution Line (TUNE2) connected to a transformer (TUNE2) and a bus (BUS2). A transformer (T2, Tima = 0.18 MVA) connects this bus to another bus (BUS4). A motor (IND2) is connected to BUS4. The diagram includes various control blocks like 'TUNE CALCULATION BLOCK' and 'CONTROL AND MONITOR IN THE SUBSYSTEM'. There are also analog meters for MW and MVAR, and a 'Fan Load' block.
- Right Panel (Plots):** A series of four real-time data plots:
 - MOTOR START:** Shows voltage (V) and current (A) for phases S1 N13, S1 N14, and S1 N15.
 - IND2A, IND2B, IND2C:** Shows current (A) for the three phases of motor IND2.
 - IND2P:** Shows active power (MW) for motor IND2P.
 - IND2Q:** Shows reactive power (MVAR) for motor IND2Q.

RSCADFX2.0

RunTime Signals Tab

- **Runtime Signals Utility Tab** allows signals to be drag and dropped onto *runtime objects*
- *Frames* and *Plots* will be containers that can contain one or more *runtime objects* like Meters, Graphs, 3P RMS, Vector Displays, Switches, Buttons etc.
- Support for *drag and drop re-arrangement of signals* once added to a case



- **Runtime Signals Utility Tab**

RSCADFX2.0

Scripting

Scripting Utility Tab

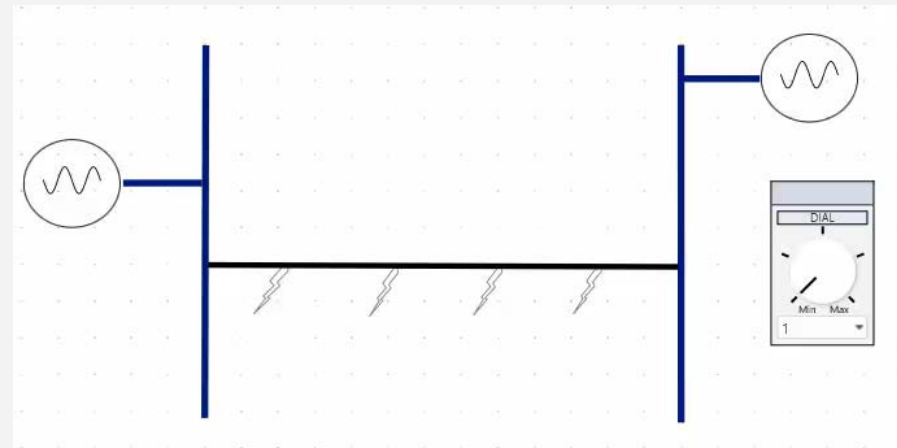
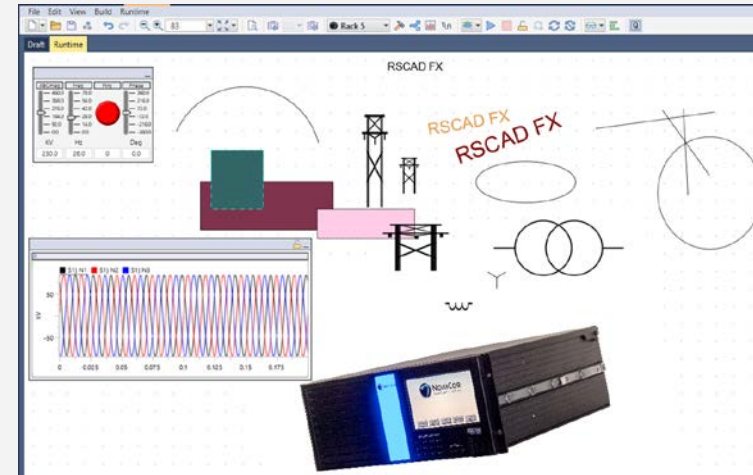
Integrated Text Editor

The screenshot displays the RSCAD FX 1.5demo software interface. The top menu bar includes File, View, Build, Launch, Utilities, Runtime, and Help. The main window is divided into several panes. On the left, the 'Scripting Utility Tab' is active, showing a text editor with a script named 'batchmode.scr'. The script contains initialization code for variables like 'llength', 'res', and 'fault_type', followed by a loop that sets fault parameters for three subsystems. The right pane shows a 'Runtime' view with a 'Fault Bus' plot displaying three sinusoidal waveforms (S1) N1, S1) N2, and S1) N3. Below the plot are control panels for 'Apply Fault', 'Fault Duration', 'Fault Type', 'Fault Resistance', and 'Line Length'. The status bar at the bottom indicates 'Mainstep size: 50.0 us RT' and the system time is 4:47 PM on 2022-12-21.

RSCADFX2.0

Enhanced RunTime Graphics

- More polished shapes for increased flexibility
- Added the ability to add multiple resizable images so that it is easier to make HMIs representing the simulation.
- Improved automation graphics



RSCADFX2.0

Integrated Case File – RTFX File

- RTFX case file
 - DFX – Draft case
 - RTX – Runtime
 - *other connecting files*
- Build folder
 - Contains files created during a draft compile
- All other files (Cable, Tline, etc.)
 - Linked to RTFX case file by being in the same directory
- When the user converts a .sib file to .rtx, the conversion will put it inside the RTFX zip file

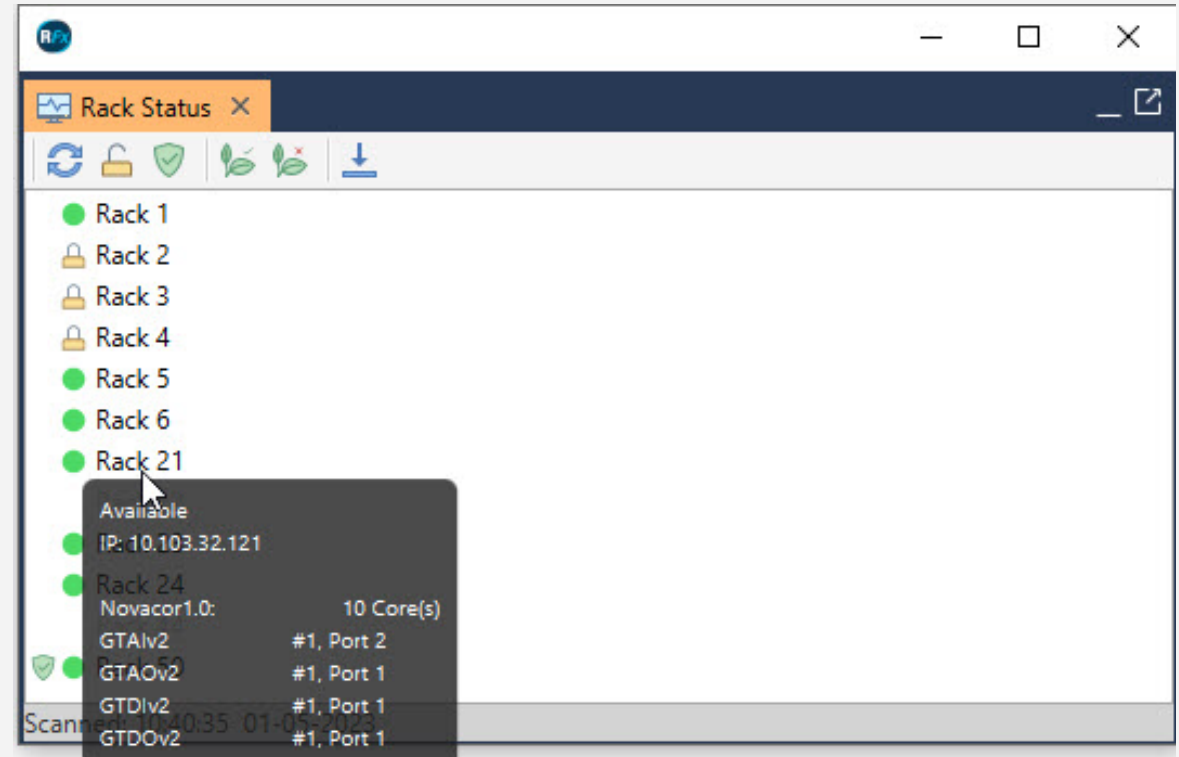
Case Directory

| Name | Date modified | Type | Size |
|--------------|--------------------|-------------------|--------|
| build_indmac | 2022-12-21 5:21 PM | File folder | |
| indmac.inf | 2022-12-21 5:21 PM | Setup Information | 10 KB |
| indmac.rtx | 2022-12-21 5:21 PM | RTFX File | 8 KB |
| indmac.sib | 2021-11-19 1:06 PM | RSCAD FX Runtime | 8 KB |
| indmac_r21 | 2022-12-21 5:21 PM | File | 284 KB |
| t3.tli | 2022-12-19 3:32 PM | TLI File | 2 KB |
| t3.tlo | 2022-12-19 3:32 PM | TLO File | 1 KB |
| t13p8.tli | 2022-12-19 3:32 PM | TLI File | 2 KB |
| t13p8.tlo | 2022-12-19 3:32 PM | TLO File | 1 KB |

RSCADFX2.0

Rack Status Utility Tab

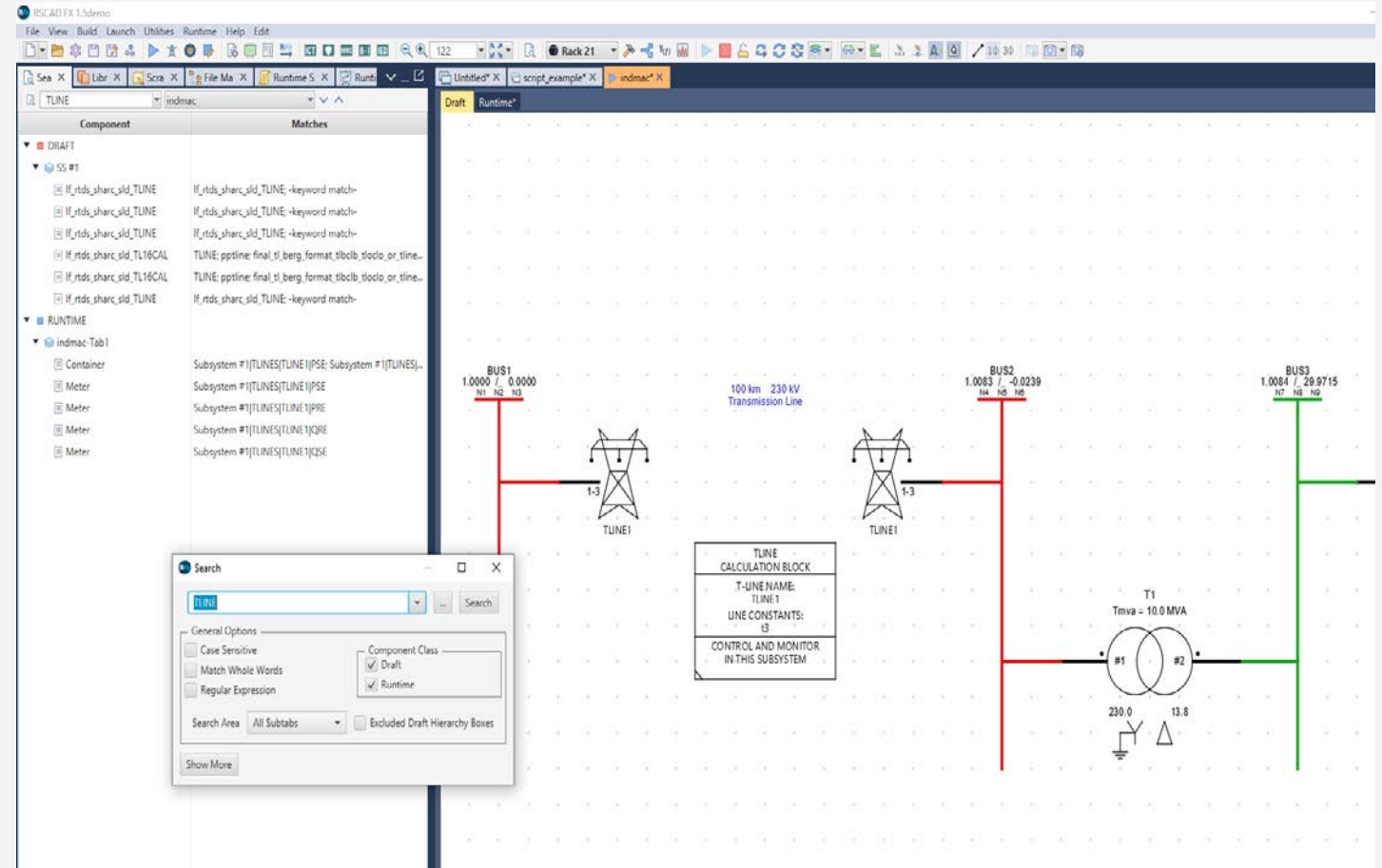
- Provides easy access to available hardware configurations
- Displays current status, IP address, connected peripheral cards
- Rack Security
- Retrieve Rack Logs



RSCADFX2.0

Search Sidebar

- Moved existing functionality into a utility tab
- Required in order to consolidate Runtime and Draft searches
- Kept existing Tree view



RSCADFX2.0

Other Notable Features in RuntimeFX

- Added Undo/Redo Functionality
- Tighter integration of Draft and Runtime so that changes in one does not break the other (moving signals between Subsystems or between Mainstep-Substep)
- Improved Relay Characteristics
- Added support for saving plot data in COMTRADE ver. 2013 format.

RUNTIME FX

Looking Forward

- Stability Analysis Tool



- Python Integration for writing scripts
- MultiPlot functionality built-in RunTime
- Tline/Cable Applications updated

POWERFACTORY TO RSCAD CONVERSION

- PowerFactory
 - Power system analysis tool
 - Can perform Loadflow, Short-circuit Analysis, TSA, and EMT simulation.
- PowerFactory cases exported as DGS ASCII files can be converted to RSCAD .rtfx files.
- Currently supports only 3 phase components
- Conversion tool allows users to reorganize the case before launching RSCAD FX

The image shows two screenshots related to the conversion process. The top screenshot displays the 'RSCAD Conversion Utility' dialog box with the 'PowerFactory to RSCAD' option selected. The bottom screenshot shows the 'PowerFactory to RSCAD Conversion Tool' interface, which includes a table of network components and a network diagram.

| Network | Nodes | Load |
|--------------|-------|------|
| Unnamed Rack | 36 | 200 |
| BUS4, DL4 | 3 | 0 |
| BUS6, BUS12 | 6 | 0 |
| BUS11, BUS3 | 9 | 0 |
| BUS7, BUS9 | 9 | 0 |
| BUS5, DL5 | 3 | 0 |
| BUS2, BUS10 | 6 | 0 |

The network diagram shows a complex interconnection of buses and lines. A red box highlights a specific sub-network consisting of BUS5, DL5, and BUS2, BUS10, connected by line L3. Other buses shown include BUS11, BUS3, BUS4, DL4, BUS6, BUS12, and BUS7, BUS9, connected by lines L1 through L7.

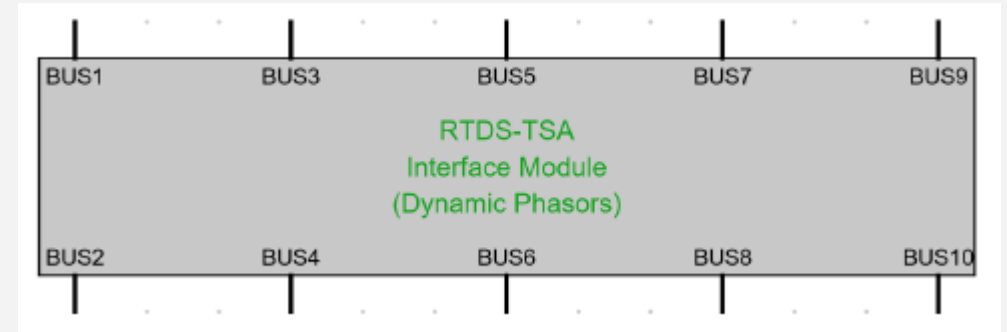
TRANSIENT STABILITY ANALYSIS (TSA) MODULE

TSA

- To determine the stability of a power system in phasor domain.
- Simulate much larger networks than EMT
- TSA module in RTDS intended to:
 - Represent a portion of a larger power system (up to ~2000 buses) using an equivalent
 - Interface TSA module with EMT simulation (co-simulation/ hybrid simulation)
 - Standalone TSA simulation also supported.
 - Reduce required number of cores (TSA module requires one core).



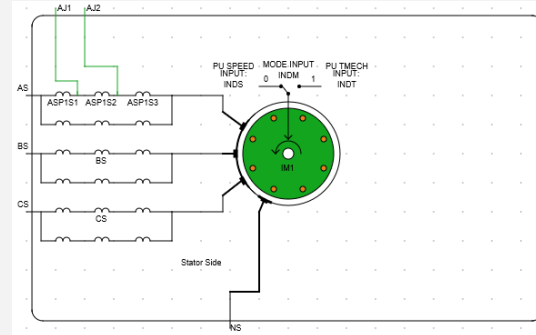
TRANSIENT STABILITY ANALYSIS (TSA) MODULE



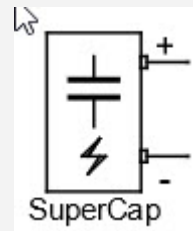
- PSS/E data files are required as input
- A GUI named “RTDS-TSA Setup” is available to initialize the TSA in RTDS.
- To interface the TSA module to an EMT model, an interface module based on Dynamic Phasors (DP) is available in the RSCAD library.
- A maximum number of EMT-DP interface buses allowed is 10, and the maximum number of DP-TSA interface buses permitted is 15.
- Large power systems can be partitioned and simulated using multiple TSA units. Up to four TSA units can be connected using the DP interface component.

COMPONENT MODELS

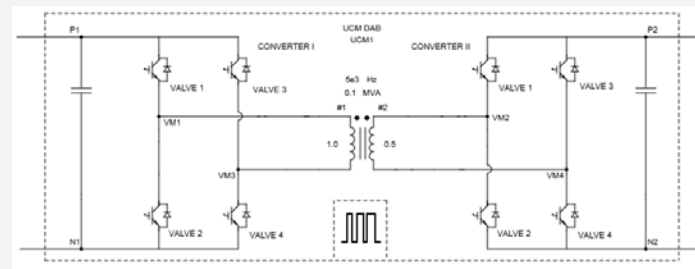
- Faulted Induction Machine



- Super Capacitor Bank
 - Parallel/series capacitor units
 - V-Q characteristic



- Dual Active Bridge (DAB) UCM with scaling



- UMEC transformer models with hysteresis

COMPONENT MODELS

Looking Forward

- RSCADFX2.1
 - MMC with embedded battery
 - PMSM light
 - Family of Hydrogen Models
 - Fuel cell, Electrolyzer , Storage tank, Compressor
 - Example Cases

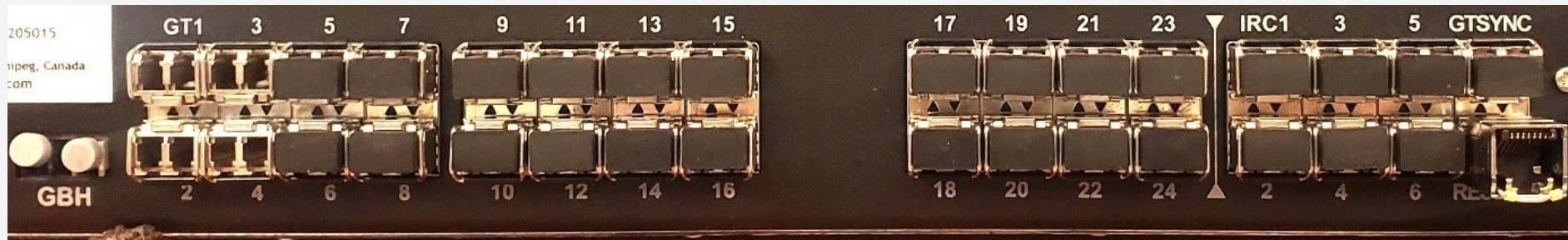
GTSOC– BLACK BOX CONTROL INTEGRATION

- Features a powerful FPGA board with multi -processor system -on-a-chip technology
- GTSOC used for black box control
- Vendor can provide control model to customer while protecting IP
- Connects to NovaCor through fibre cable(s)
- DOTA component added to the Draft circuit to provide interface between the NovaCor and the GTSOC
- Special tool provided by RTDS required to compile the .a library file and generate firmware.



NOVACOR ETHERNET PORT

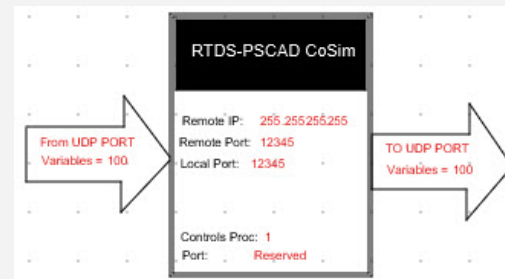
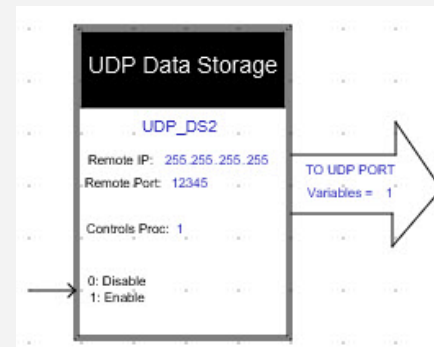
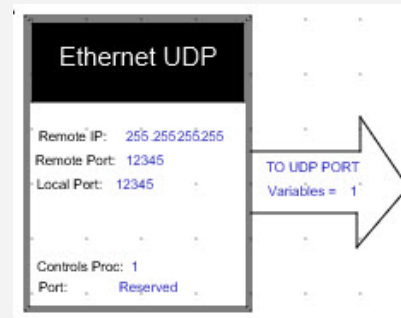
- Reserved port 32 on chassis now be used as an ethernet port.



- For Port 32 supported Ethernet transceivers are
 - Avago ABCU-5731R - tri speed 10/100/1000
 - Avago ABCU-5730R - 1000baseX (1G speed only)
 - Finisar FCLF-8521 - 1000BaseX (1G speed only)

NOVACOR ETHERNET PORT

- Three applications currently supported.
 - Ethernet UDP
 - General component send out UDP packets
- Data Logger
 - Hours of simulation data written to a text file
- RTDSPSCADCoSim
 - Non real-time control interface to PSCAD dll



QUESTIONS?

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