GLOBAL PST CONSORTIUM

# Real Time Phasor Analytics (RTPA) and RTPA-SCR System Strength Online Tool

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# Real Time Phasor Analytics (RTPA)

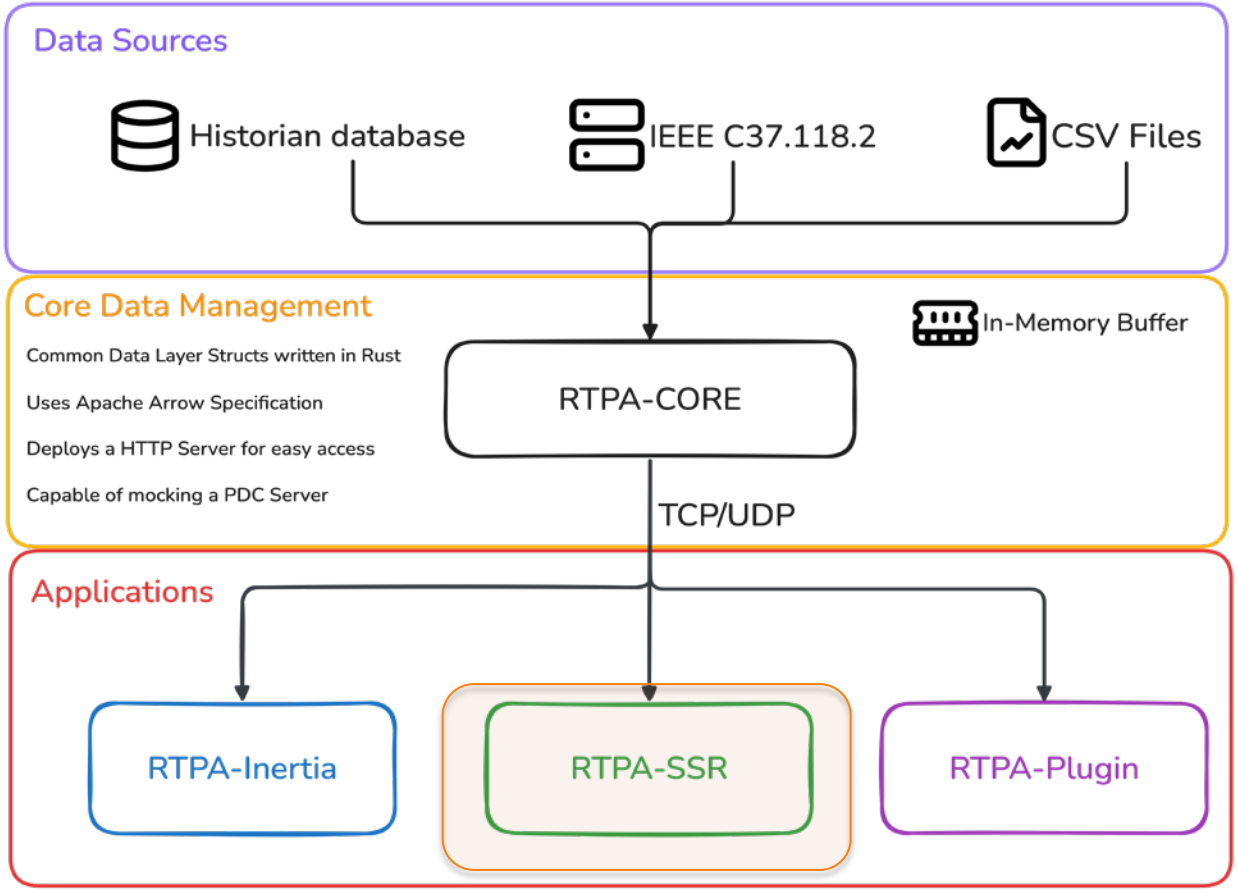
**WHAT IT IS?**

- Open-source package for accessing Power Management Unit (PMU) / Phasor Data Concentrator (PDC) data in a standardized format.

**WHAT CAN IT DO?**

- Connect to a single or multiple PDC using the IEEE C37.118-2 specification
- Asynchronous connection to multiple input data streams
- Mock a PDC server streaming C37.118-2
- RTPA provides bindings to Python to allow people to interact with the server without having to run Rust

**Is the RTPA compatible or useful for Modular Control Centre System of 50Hertz' ?**




`Available on GitHub: https://github.com/G-PST/RTPA-core`

* https://www.mccs.com

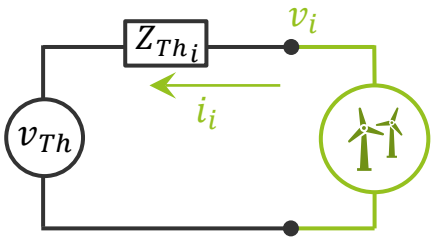
# RTPA-SCR System Strength Online Tool

**WHAT IT IS?**

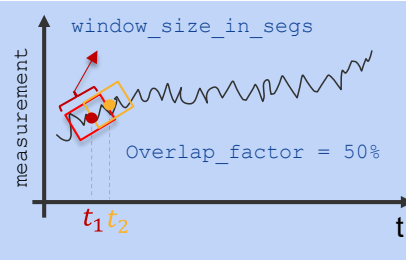
- Open-source tool for estimating online, using PMU data, the system strength in a bus of the power system.

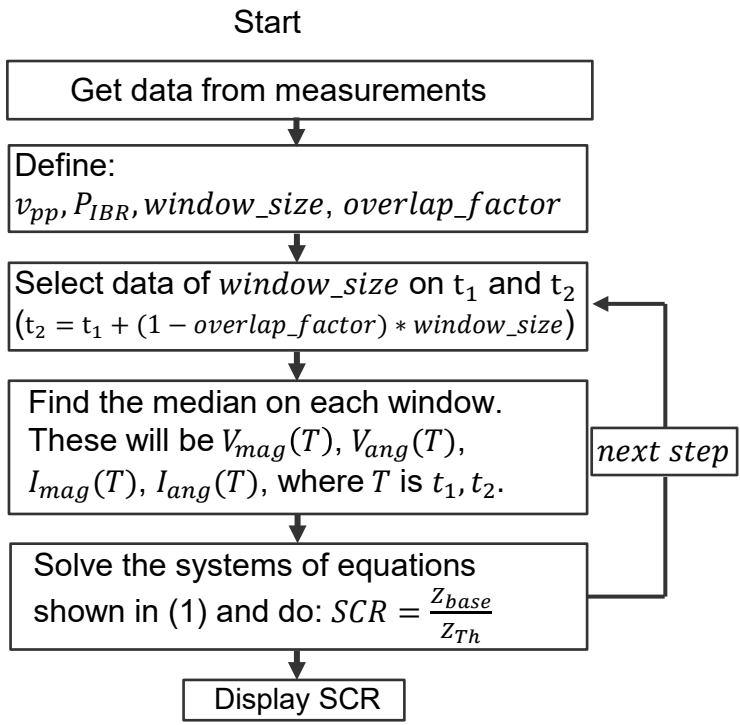
**WHAT CAN IT DO?**

- Estimate the short circuit ratio (SCR) in a bus of the power system.
- SCR is a metric that has traditionally represented the voltage stiffness of a grid. [NERC]
- It is different from offline metrics because it considers the interaction of the system and other inverter-based resources (IBRs) as it is based on real-time measurements.




$$\begin{bmatrix} 1 & i_{i_{T1}} \\ 1 & i_{i_{T2}} \end{bmatrix} \begin{bmatrix} v_{Th} \\ Z_{Th_i} \end{bmatrix} = \begin{bmatrix} v_{i_{T1}} \\ v_{i_{T2}} \end{bmatrix} \quad (1)$$




Available on GitHub: https://github.com/G-PST/RTPA-SystemStrength

# RTPA - SCR

## Results on the IEEE 9 bus system with one wind farm

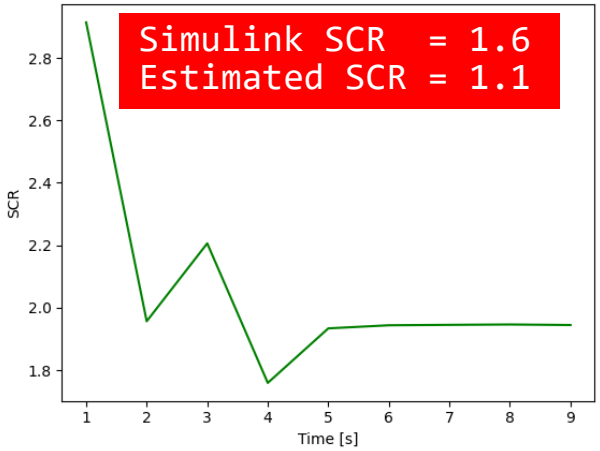
*SCR estimation result on the IEEE 9 bus test system with one wind farm*

| WT Dispatch [MW] | SCR – Simulink ($y_i$) | SCR – Estimated ($\hat{y}_i$) | Error |
|---|---|---|---|
| 150 | 1.6 | 1.1 | 31% |
| 13 | 5.6 | 4.5 | 19% |
| 17 | 7.4 | 5.1 | 31% |
| 18 | 11.6 | 7.5 | 35% |
| 18 | 14.6 | 9.7 | 34% |
| 9 | 28.8 | 20 | 31% |
| 3 | 77.2 | 57.1 | 26% |
| 2 | 128.1 | 85.8 | 33% |

| | |
|---|---|
| Very strong | SCR ≥ 5 |
| Strong | 3 ≤ SCR < 5 |
| Weak | 2 ≤ SCR < 3 |
| Very weak | SCR < 2 |

$$\text{MRE} = 30\%$$

$$MRE = \frac{1}{n}\sum_{i=1}^{n}\frac{|y_i - \hat{y}_i|}{\hat{y}_i}$$




```
window_size_inSegs = 1 #s
overlap_factor = 0 #pu
```

# Thank you!

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