



IEEE SGSMA 2021 - VIRTUAL EVENT

Panel 8 - Perú

COES Phasor Measurement Pilot Project



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COES Phasor Measurement Pilot Project

- The PMU Pilot Project is contemplated within Stage C of Board Resolution No. 239-2015-OS / CD, with the objectives mentioned therein, as well as gathering information and experience in the use of synchrophasor technology and WAMS systems.



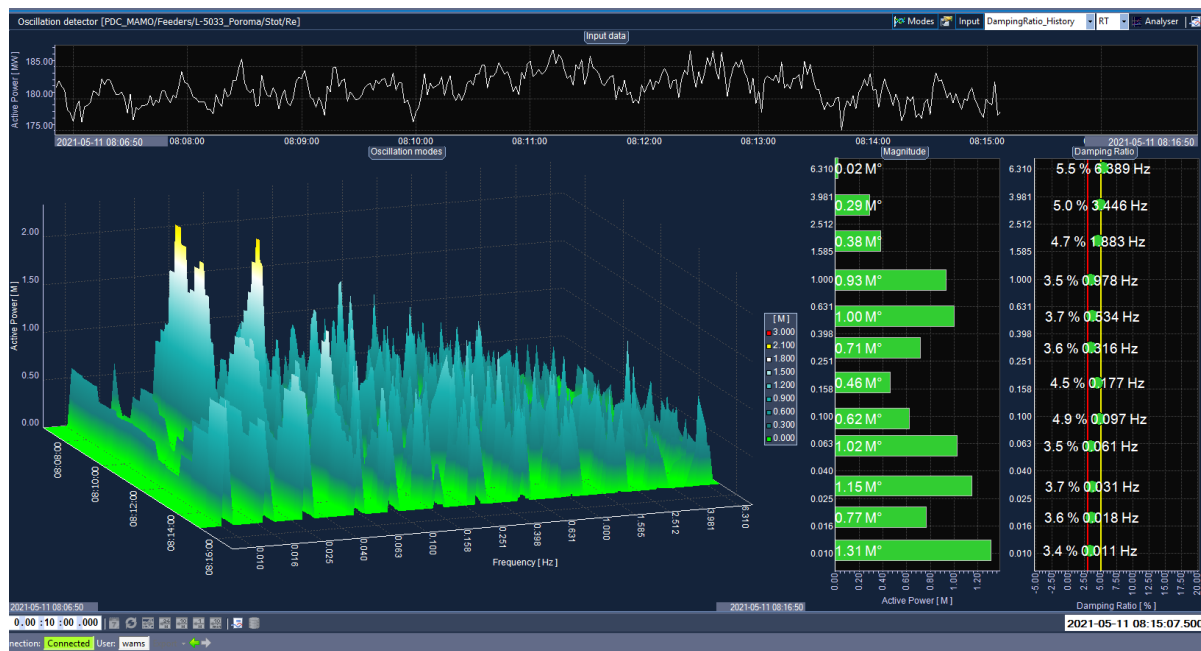
WAMS FUNCTIONALITIES

- The project began in 2017, with the commissioning of the ELPROS brand WAProtector system, which has 15 phasor measurement points, which allow the WAMS system to carry out:
 - Oscillation Detection and Localization functionalities
 - In addition, there are 5 points waveform measurements which are part of the **Sub-synchronous Resonance Phenomenon Monitoring Pilot Project**.

OSCILLATION DETECTION

Inter-area and local oscillations

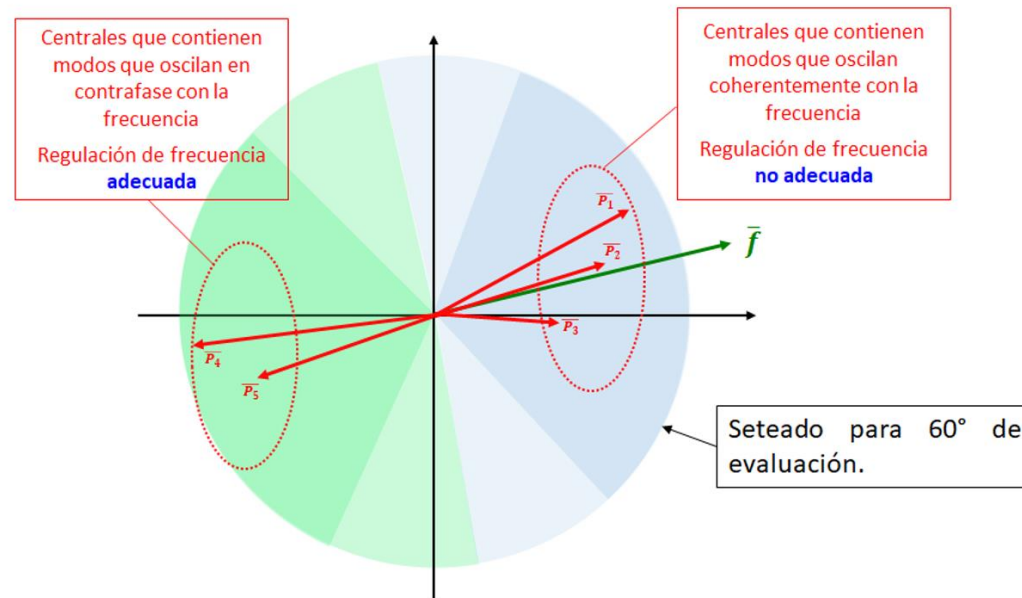
- Regarding Oscillation Detection, the WAMS system is calibrated for alarming and recording of inter-area and local oscillations by means of the spectral decomposition of active power signals from 220 kV and 500 kV transmission lines that serve as a link between areas and are located near large power plants.



OSCILLATION DETECTION

Very low frequency oscillations

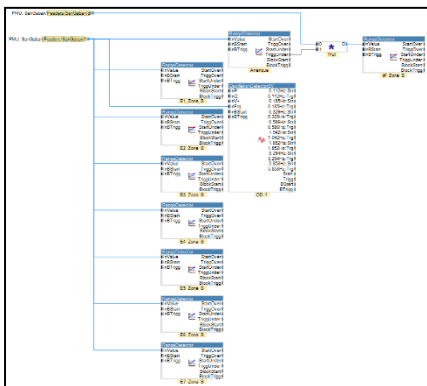
- Likewise, the detection of very low frequency oscillations is carried out, by means of the spectral decomposition of frequency signals in all the PMUs. Because there are no phasor measurements in each synchronous machine connected to the SEIN (Peruvian Power System), it is not possible to locate the very low frequency oscillations "on-line", which is done in a post-process process. operating through the use of records per second that are sent by the generating companies, with which it is possible to identify the main generation units involved in some very low frequency oscillation phenomenon that could be detected.



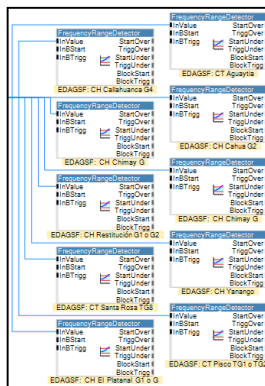
RANGE DETECTOR FUNCTIONALLITY

- Range detection is mainly focused on frequency signals, in order to identify "on-line" events such as ERACMF or EDAGSF that may occur, and to be able to provide the operator with a diagnosis of a fault situation in a timely manner.

ERACMF

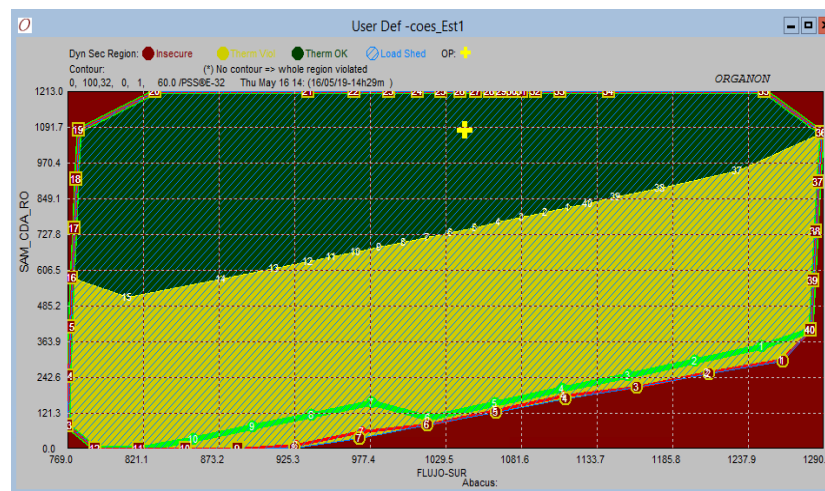
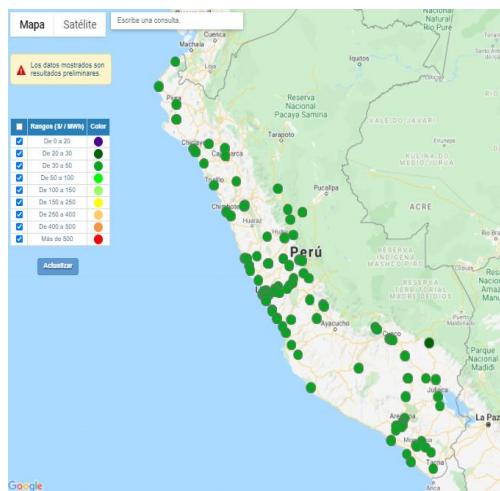


EDAGSF



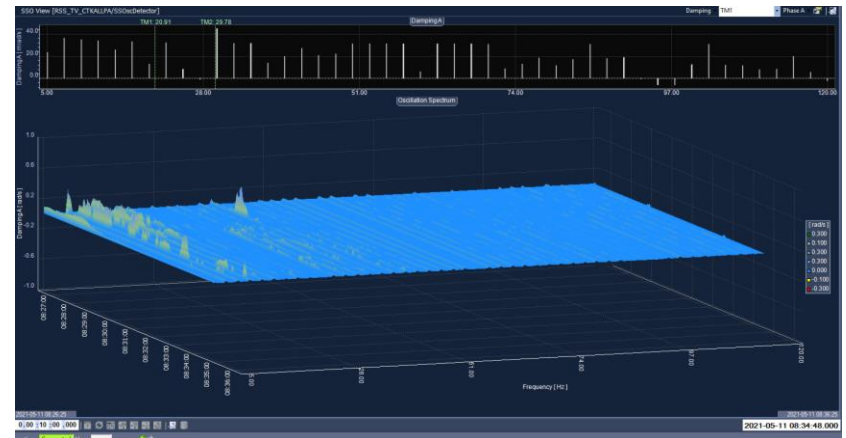
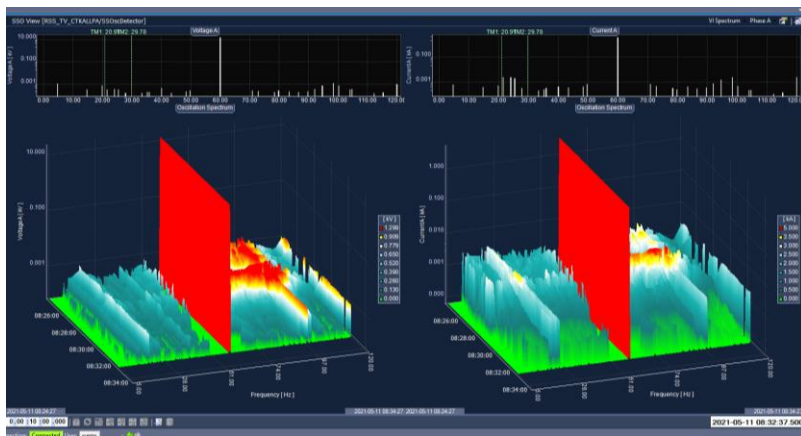
SCADA DATA EXCHANGE

- Likewise, there is an IEC104 link with the SCADA Spectrum Power 7 system of the COES, through which angular measurements are sent in order to improve the state estimation process of the TNA module. It is worth mentioning that the converged power flow based on the state estimate of the TNA is used in different COES processes such as:
 - Real time marginal cost calculation
 - Real-time dynamic contingency analysis - ORGANON
 - Real-time Voltage Stability Index - IET



SSR MONITORING

- Regarding the Sub-synchronous Resonance Phenomenon Monitoring Pilot Project, there is currently the voluntary participation of three companies, which together have installed waveform measurement points in five thermal units, which are close to a 500 kV runner with capacitive series compensation.
- The project consists of reconstructing the impedance based on the waveform measurements and proceeding with the calculation of the electrical damping for each torsional mode of the machine under analysis. According to the electrical damping values, it is possible to rule out risk of RSS when it is in positive values, and in the case of incurring in negative ranges lower than the tolerance of each thermal unit, it is the responsibility of the owner of each unit to inspect mechanical aspects to determine if there was damage or wear. This process allows the monitoring of this phenomenon, reducing to specific time intervals of interest.





THANK YOU VERY MUCH