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What are the main challenges in testing related to the application of LPIT in the different stages of implementation and maintenance?

Testing LPITs (Low Power Instrument Transformers) during both the implementation and maintenance stages presents several challenges. Mainly due to the coexistence of high-power and communication circuits with the same device. During the implementation stage, deep tests are required to ensure optimal performance at both the primary level, which includes evaluating current and voltage sensors, and the secondary level, which involves verifying the sample values protocol and time synchronization. Finally, during the maintenance stage, a holistic approach is necessary for both primary and secondary levels, especially when the LPIT is energized.

Considering the sensor tests at the primary level, some examples of tests that can be carried out include: linearity, frequency response, and sensor response for synchrophasor applications.

Considering the tests with merging unit and time synchronization (PTP or IRIG-B) at the secondary level, some examples of tests that can be carried out include : sampled values frame format, CT and VT transformation ratio, sampling rate, network issues : corrupted frames, duplicated frames, out-of-order frames and frame loss.

Some testing experiences with LPITs in Brazil will be presented below.

The frequency response test in VT was carried out considering the secondary of VT and the measurements made using IED oscillography and the MultimSV software from CONPROVE. The test scheme is illustrated in Figure 1.

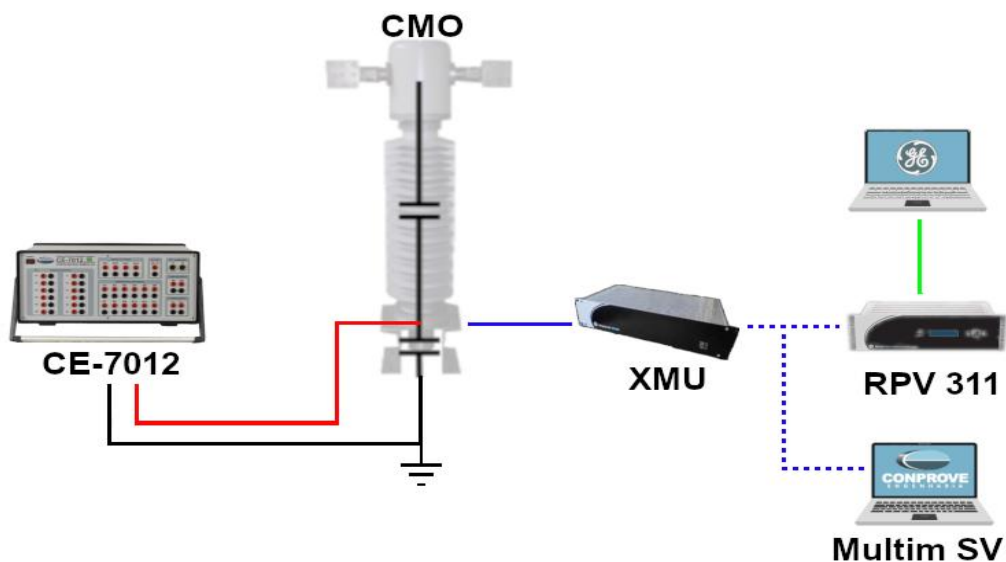


Figure 1 - Frequency response test in VT

The frequency response test in CT was carried out considering the primay of CT and the measurements made using IED oscillography and the MultimSV software from CONPROVE. Time synchronization was achieved using PTP. The test scheme is illustrated in Figure 2.

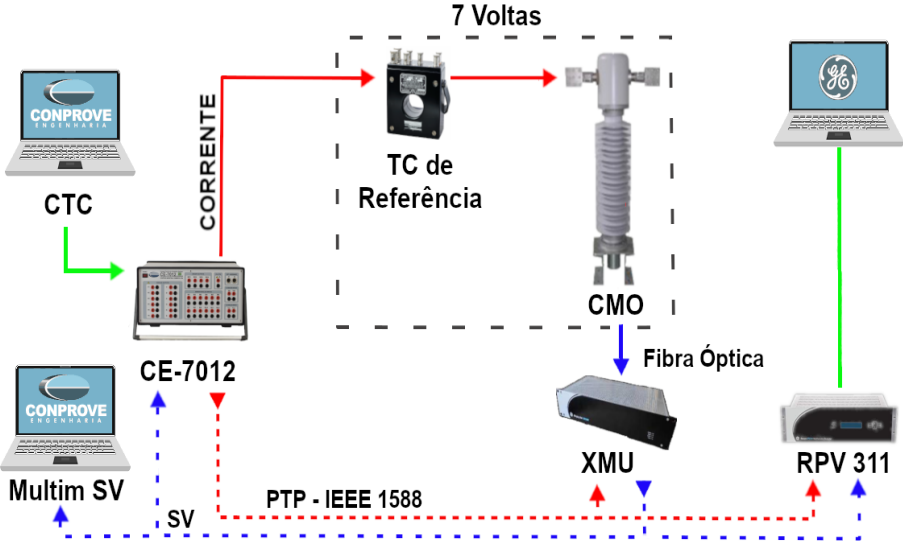


Figure 2 - Frequency response test in CT