NIST
National Institute of Standards and Technology
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NIST Interoperability Standards Update Part 2: Testing and Verification of Interoperability

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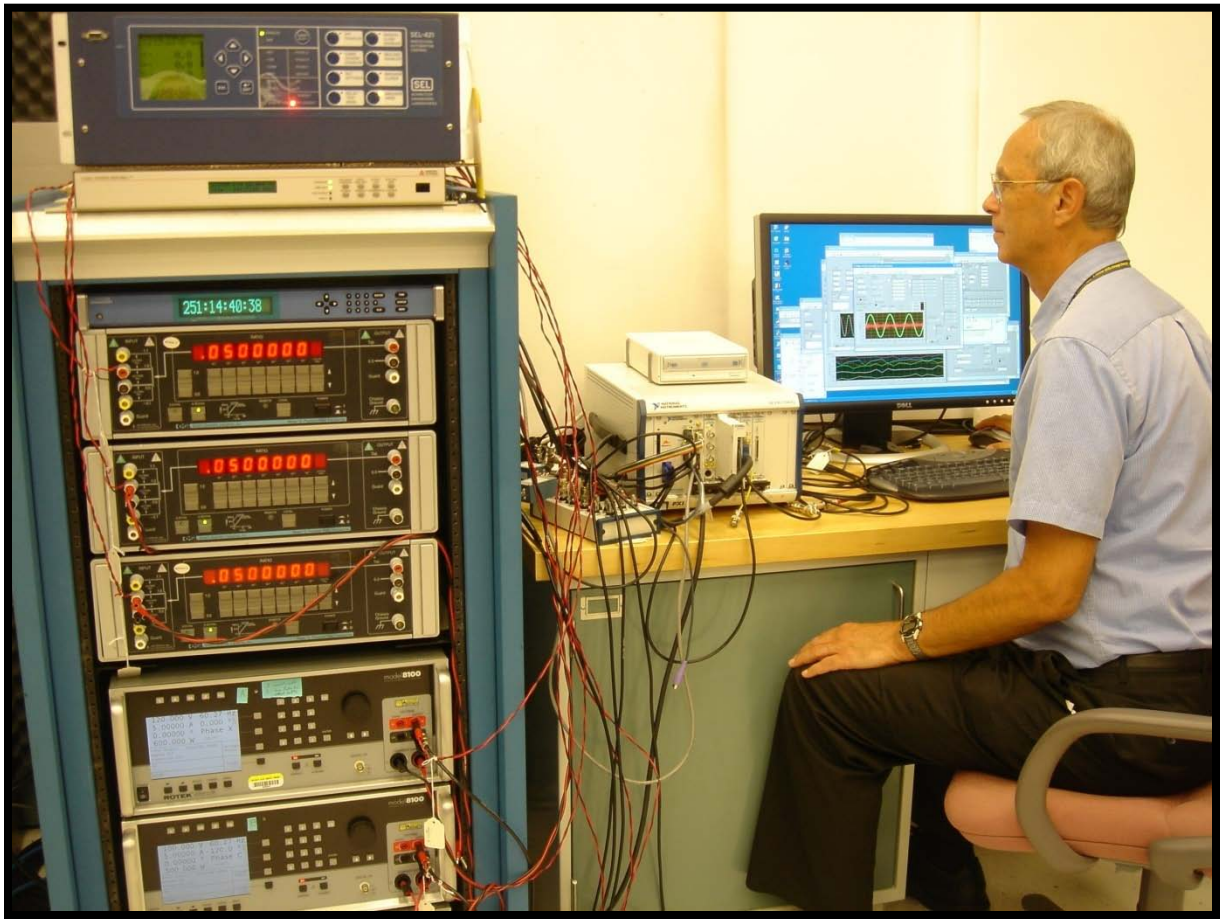
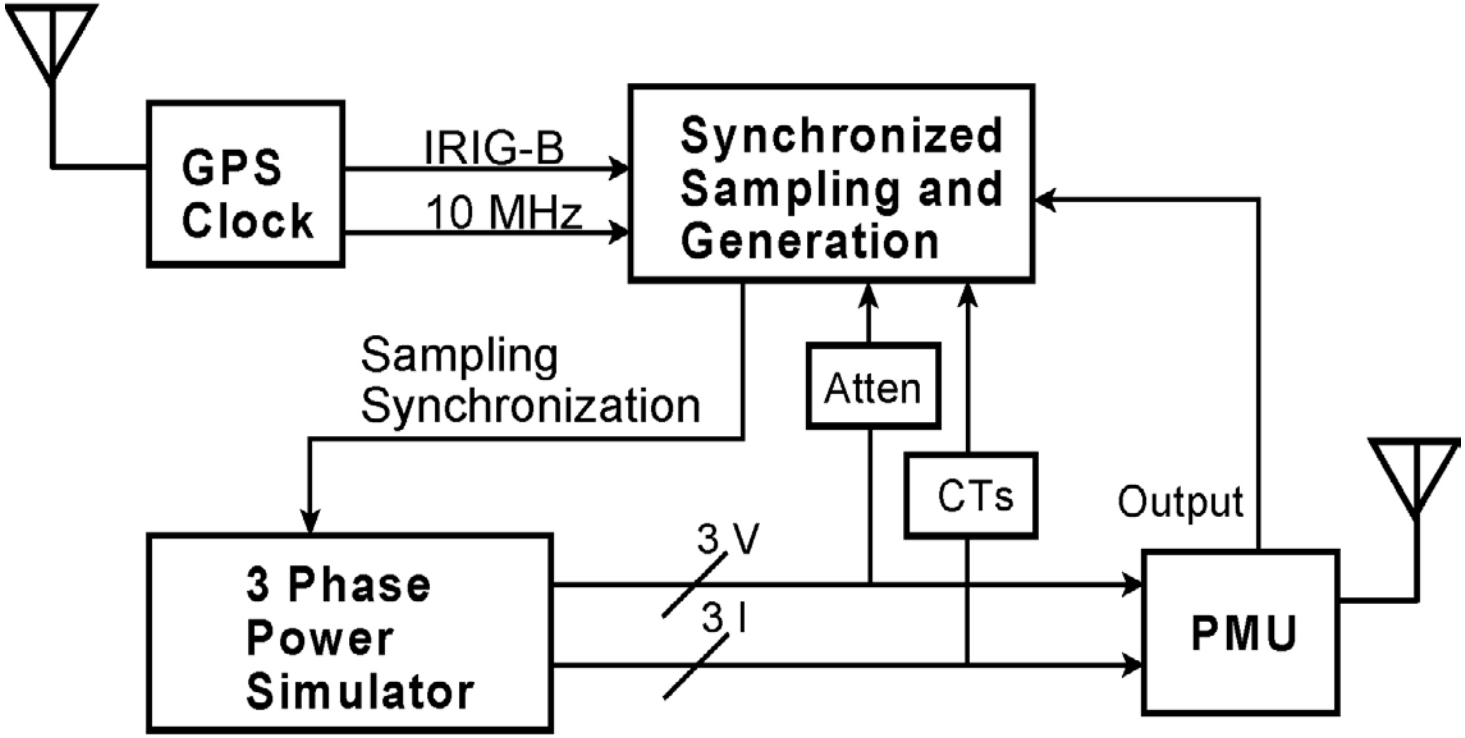
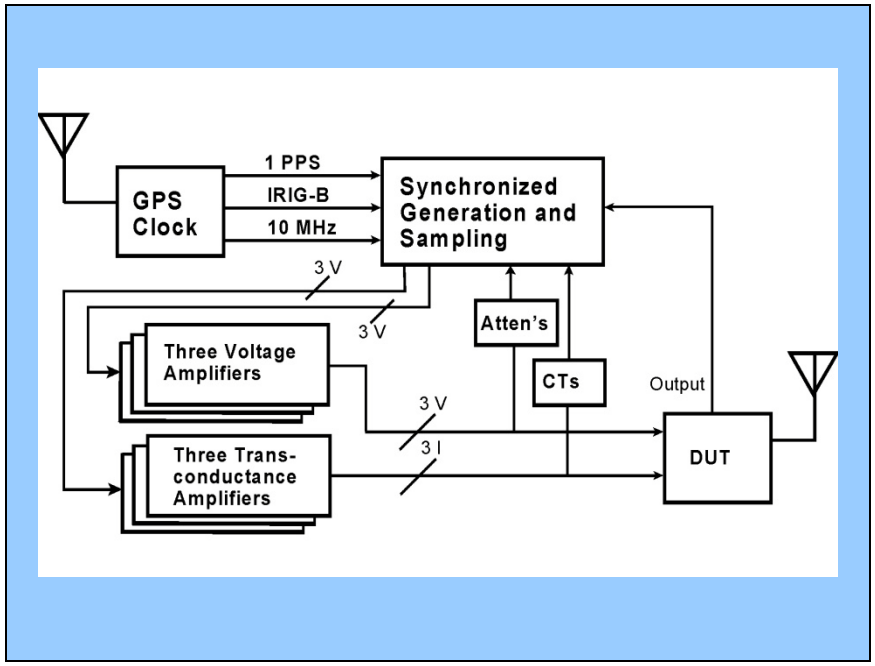
NIST Synchrometrology Testbed: Static PMU Calibration System



NIST Static PMU Calibration System



NIST Dynamic Test System



- Testbed Synchronized to UTC
- Generates signals modulated in amplitude, and frequency / phase
- Generates steps in magnitude, phase, or freq.

Additional Testing in Revised C37.118.1 Synchrophasor Standard

New PMU Tests Requirements

- Added reporting rates of 50 and 60 fps, encourages 100 and 120 fps
- New Classes P and M versus levels 0 and 1
- Frequency variation test at room temperature and at 0°C and 50°C, and frequency ranges that are dependent on reporting rates.
- Magnitude variation of current to 200%
- Out-of-band interference at nominal signal frequency and at ⅔ of frequency range

Additional Testing in Revised C37.118.1 Synchrophasor Standard

New PMU Tests Requirements

- Accuracy requirements for frequency and rate-of-change-of-frequency, ROCOF, under frequency variation, harmonic distortion, out-of-band interference, and dynamic tests
- Dynamic test requirements for magnitude and phase modulation, frequency ramp, and magnitude and phase steps
- New test parameters include step response time, delay time, overshoot

Additional Changes to NIST Test Systems

- Developing test methods for PMU calibrators
- Expect to be requested to test PMUs with 1588 synchronization capability
- Introduction of 61850 message transmission
- Adding new NIST developed amplifiers to the dynamic test system to increase stability and reduce noise
- Training Yi-hua Tang to take over the NIST PMU calibration operation

NIST Support for PAP 13 and NASPI – extension of NIST Synchrometrology Lab

Two contracts awarded by NIST to support PAP13, PMU, PDC work:

1) ESTA International, Quanta Technologies

- Develop recommendations for extension of NIST synchrometrology testbed to include communications to support PAP 13 (and PAP12) tasks
- Support harmonization/mapping of standards – text, models
- **Develop requirements for PMU and PDC testing, extension of NIST synchrometrology testbed**

NIST Support for PAP 13 and NASPI – extension of NIST Synchrometrology Lab

Two contracts awarded by NIST to support PAP13, PMU, PDC work:

2) IPKeys, Quanta Technologies

- support NASPI PSTT and NIST to develop extended PMU-PDC and PDC-PDC communication methods / protocols
- **Additional Support for the Requirements, Testing and Certification Approaches, and Calibration and Test Guideline for Phasor Measurement Units (PMUs) and Phasor Data Concentrators (PDCs)**