Field end-to-end calibration and testing for synchrophasor system

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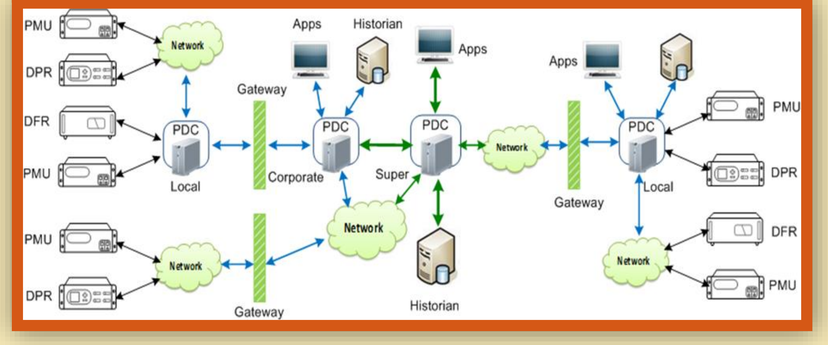
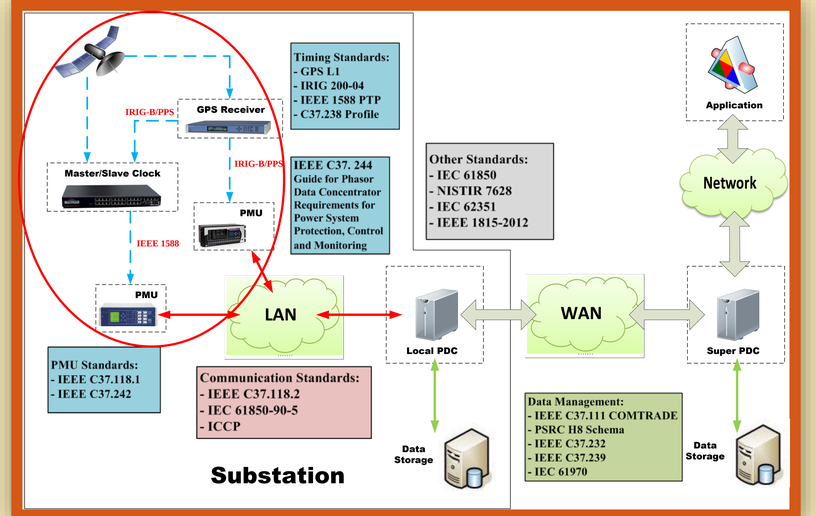
OBJECTIVES

- Enable commissioning of PMUs
- Field calibration
- Periodic maintenance tests
- Application testing
- Troubleshooting

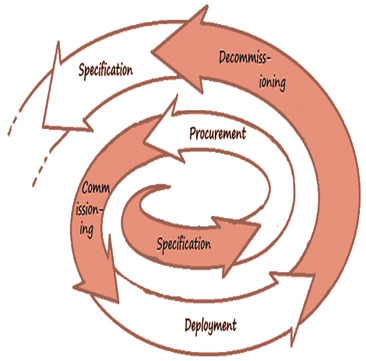
ELEMENTS OF THE SYNCHROPHASOR SYSTEM



SYNCHROPHASOR LANDSCAPE



SPIRAL LIFE CYCLE MODEL



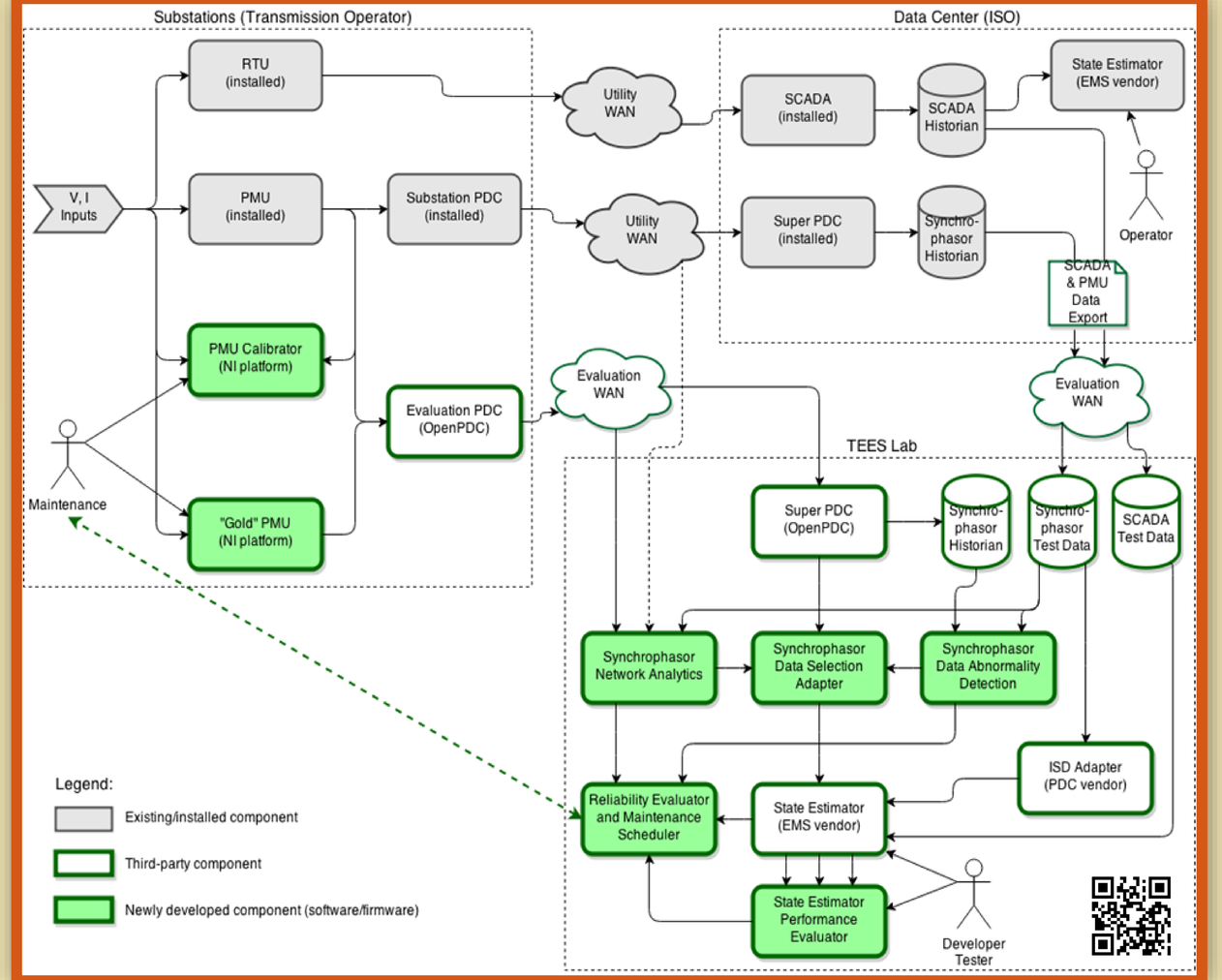
USE CASE I FIELD CALIBRATION

- Aim of this use case is implementation of tests to validate the PMU device calibration
- Tests are conducted in the field
- Calibration follows the IEEE C37.118.1 standard
- Two different groups of tests
  - Steady state tests
  - Dynamic state tests

USE CASE II IN-SERVICE PMU TESTING

- Aim of this use case is to evaluate syncrophasor system as a complete solution
- A device called “Gold PMU” will be developed to serve as a reference PMU
- Two different groups of tests
  - Field acceptance tests
  - System integration tests

END-TO-END TESTING OF THE SYNCHROPHASOR SYSTEM



ABSTRACT

- The entire synchrophasor system consists of PMU devices, communication subsystem, applications and visualization
- Evaluate syncrophasor system as a complete solution
- Confirm all pieces work properly together
- Errors caused by instrumentation channel, cabling, GPS equipment, and cyber security solutions have to be studied and taken into account
- The following test scenarios are targeted:
  - Field calibration and acceptance tests as per IEEE C37.118.1 standard
  - In-service application and system integration tests

REFERENCES

- *IEEE Standard for Synchrophasor Measurements for Power Systems, IEEE Standard C37.118.1, 2011.*
- *IEEE Standard for Synchrophasor Measurements for Power Systems, IEEE Standard C37.118.1-a, 2014.*
- *IEEE Synchrophasor Measurement Test Suite Specification, 2014.*
- *PMU System Testing and Calibration Guide, NASPI 2007.*
- *IEEE Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control, 2013.*