ECE 444 / 544

SUPERVISORY CONTROL
AND CRITICAL
INFRASTRUCTURE SYSTEMS

SESSION no.  16
Due: Session 17: [March 20]

**Students Attending the Power and Energy Automation Conference:**
Choose 3 of the presentations you attend and write a short paragraph for each indicating the title, presenter and 2-3 points you learned from the presentation.

**For Students Not Attending the Power and Energy Automation Conference**
Choose a paper from a conference or journal and write a short report (at least 1 page) summarizing key points from the paper. Properly cite the article. The link below points to a list of paper engineers from Schweitzer Engineering Laboratories have published at the Power and Energy Automation Conference in 2018 and in previous years. Other vendors have similar libraries, but they are not as easily searchable. Many of these were written with engineers from utilities. You can choose one of the papers from that list or if you wish you can find a different paper as long as it is related to the topics of this class. This can include papers listed in the references in our textbook.

https://selinc.com/literature/technical-papers/?presentedAt=PEAC
Midterm exam

- Take home exam
- 2-3 days
- given a range of days - choose when you start and finish
- between March 23 - April 2
- Short answer questions
  & some problems
IEEE (number) - DATE: Title

- usually more of a recommended practice

- users who have some sort of authority enforce them
IEEE vs IEC Standards

Enforceable

Push to tie harmonize with IEC Standards

Conformance with IEC Standards...
Role of standards

- Suppliers can design equipment to a communication standard
- Structure for communication
- Message structure
- Compatibility between equipment
- Interoperability

- IEC 61850 - Family of standards
  - Interoperability working group
    - GOOSE
    - MMS
Synchrophasor - Synchronized phasor measurements

- GPS satellites
  - accurate clock signal
  - create a time stamp for measurement

Root mean square magnitude:

\[ m = \frac{A}{\sqrt{2}} \]

\[ T = \frac{1}{f} \]

Standard defines what a synchronized phasor \( \theta \) is:

- Absolute time stamp as a reference
Precision Time Protocol

- GPS clock
- How it communicates
- Clock signal

- Time critical application
- Guarantees action occurs within a time window
- Switch over between clocks
- GPS clock
- Back up clock
ICS - a standard do a good job defining communication

- Applications that use the communication are less standardized

- Cybersecurity for this communication is also not well standardized

→ Tends to be an add-on

→ NIST 7628
- Guideline for smart grid cybersecurity