

Overview of the NYPA Synchrophasor Network: Past, Present, and Future

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Outline

- Evolution of NYPA's synchrophasor system
 - Phasor measurement unit (PMU) installations
 - Local applications
- Present state of NYPA's synchrophasor network
 - System architecture
 - Applications
- Future development projects for the New York state synchrophasor network



The NYPA Transmission System



PMU Installations

> 1990 - Marcy 765 kV and Massena

- Marcy Massena 765 kV line
- Virginia Tech prototype phasor measurement unit
- 10/1993 Fraser and Robinson Rd. (NYSEG)
 - Oakdale, Coopers Corner, Edic lines
 - Static Var compensator current
 - Capacitor banks
- 12/1993 Marcy 765 kV and Massena
 - Marcy Massena 765 kV line
 - Massena Chateauguay 765 kV line
- 1995 Marcy 345 kV (two units)
 - Edic, Volney, Coopers Corner, New Scotland lines
 - EOVT equipment
 - Convertible Static Compensator StatCom current
- 1996 Niagara 345 kV
 - Kintigh, Rochester, HydroOne lines
- 1998 Blenheim Gilboa
 - New Scotland, Leeds, Fraser lines
- 2004 East Garden City
 - Long Island Sound underwater cable
- > 2011 St. Lawrence



Real-Time Synchrophasor Network

- Installation of a phasor data concentrator (PDC) at NYPA energy control center at Marcy (2004)
- Real-time data streaming over leased phone lines, fiber, or microwave link
- Data rates currently at 30 samples/sec



Current PMU Data Applications

- Real-time data visualization
 - StreamReader
 - Real Time Dynamics Monitoring System (RTDMS)
- Harmonic monitoring system
 - Monitor system harmonics
 - Monitor system imbalances
 - Monitor substation state
- Geomagnetically-induced current (GIC) monitoring system
- Disturbance recording
- Data archiving



Real-Time Data Visualization (StreamReader)



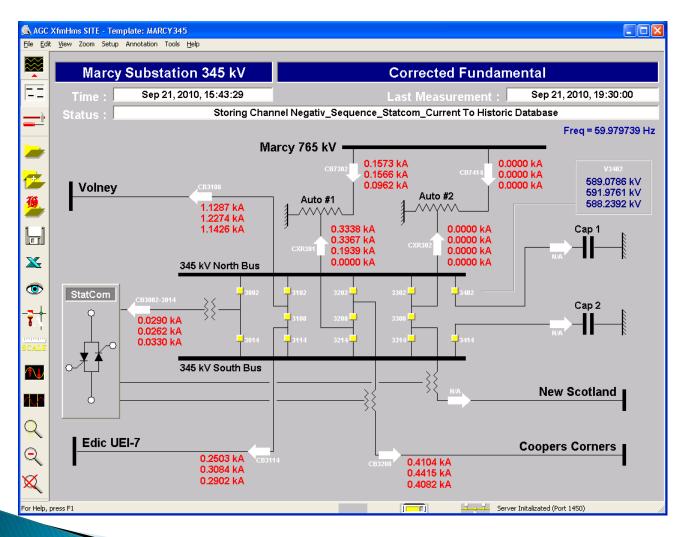


Real-Time Data Visualization (RTDMS)

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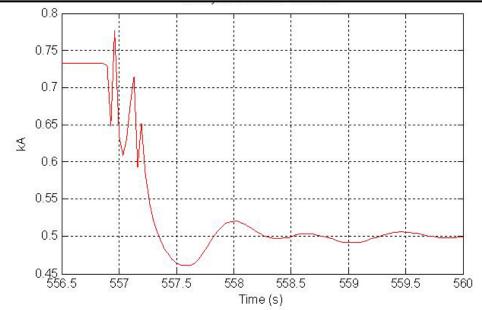
Harmonic Monitoring System

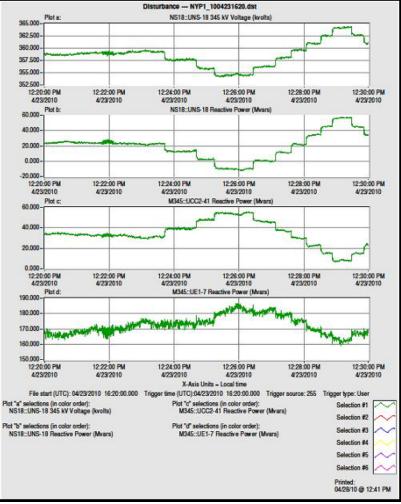


- Substation state estimation at fundamental frequency
- Segregated phase model
- Used to detect and monitor system asymmetries and imbalances
- Used to detect substation problems



Disturbance Recording and Real-Time Data Archiving







Future Development Projects

- NYISO-DoE SGIG project
- NYSERDA synchrophasor project
- GA Tech DoE project
- PMU measurements in EMS and state estimator
- EPRI Northeastern Univ. strategic use of PMUs project
- Disturbance data retrieval project and PMU GUI upgrade

