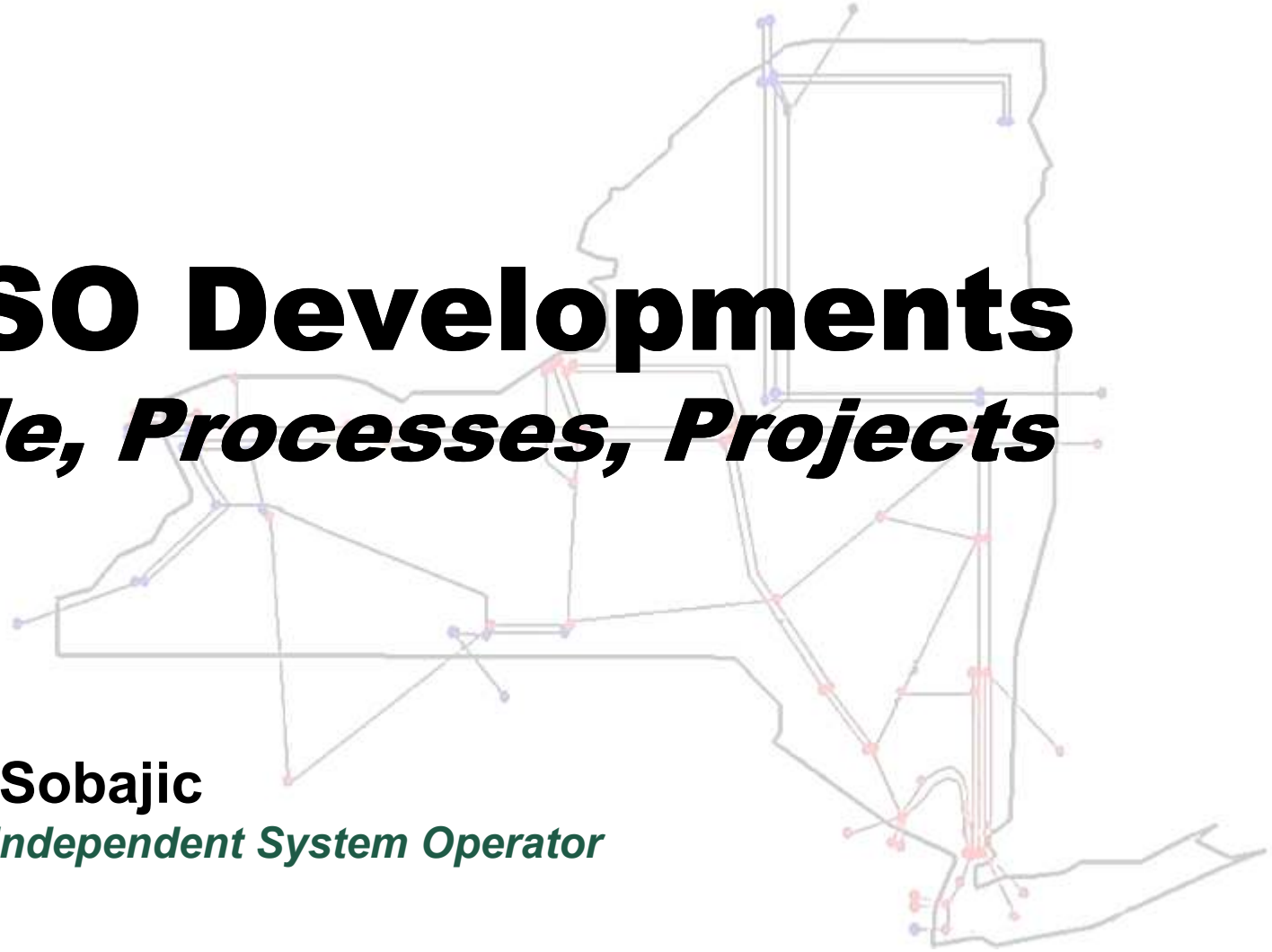
NYISO Developments

People, Processes, Projects



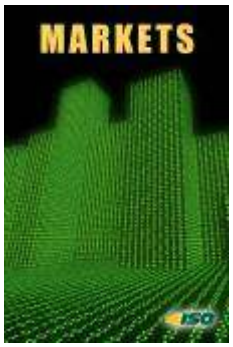
Dejan J Sobajic

New York Independent System Operator

Roles of the NYISO

Reliable operation of the bulk electricity grid

- *Managing the flow of power over 11,000 circuit-miles of high voltage transmission lines from more than 500 generating units*



Design and implementation of open and competitive wholesale electricity markets

- *Market transactions totaling more than $70 billion since inception in 1999*

Planning for New York's energy future

- *Assessing needs over a 10-year horizon and evaluating the feasibility of projects proposed to meet those needs*

Future Developments

- Increased penetration of
  - *Wind and Solar*
  - *Demand Resources with RTPs*
  - *Storage Technologies*
- Realistic market models need to be solved
- Unit commitment with better models for uncertainty
- Pricing of reactive power

Future Developments – cont'd

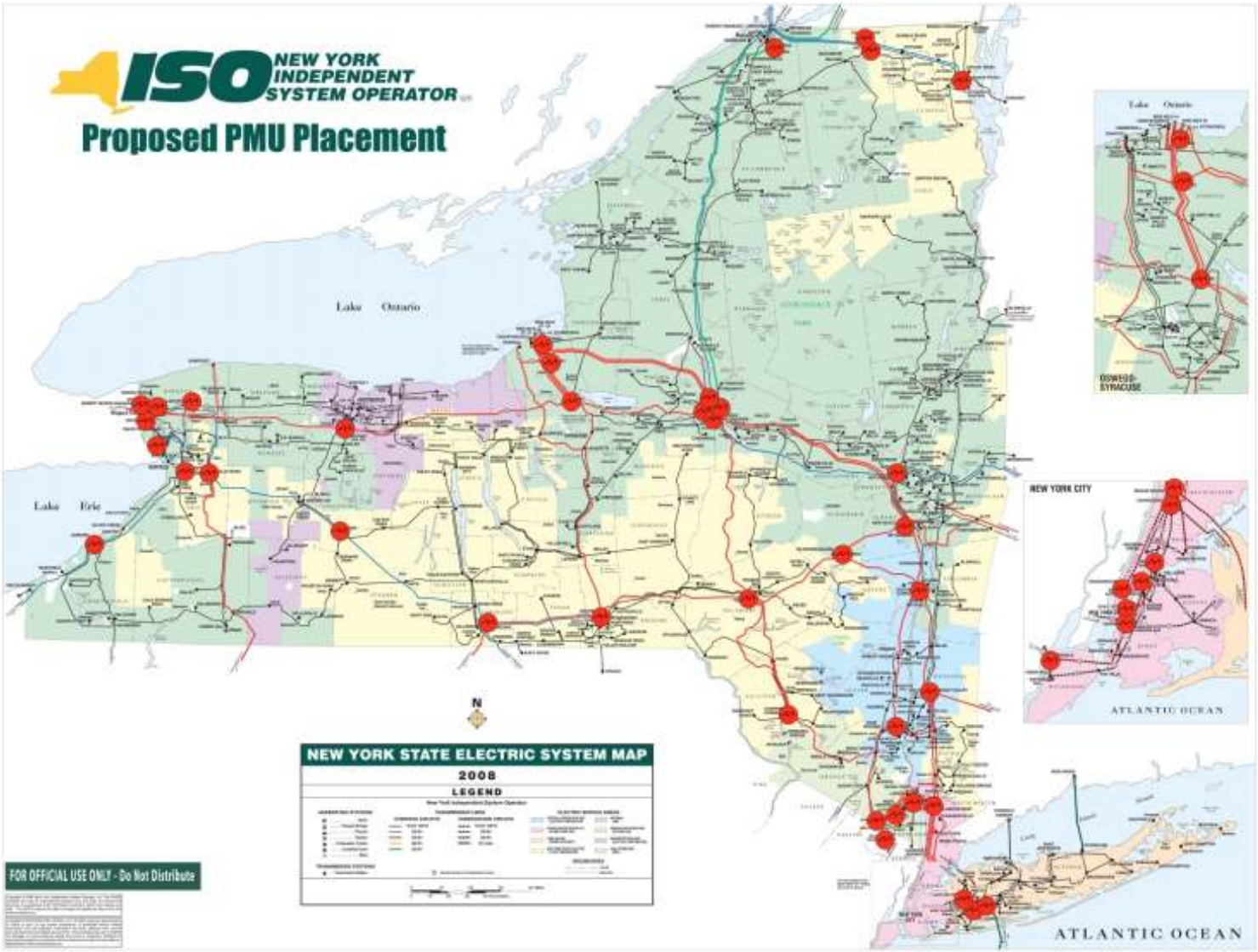
- Real time dispatch each 5min, look ahead
- Transmission switching with <15min scheduling
- Wide-area planning

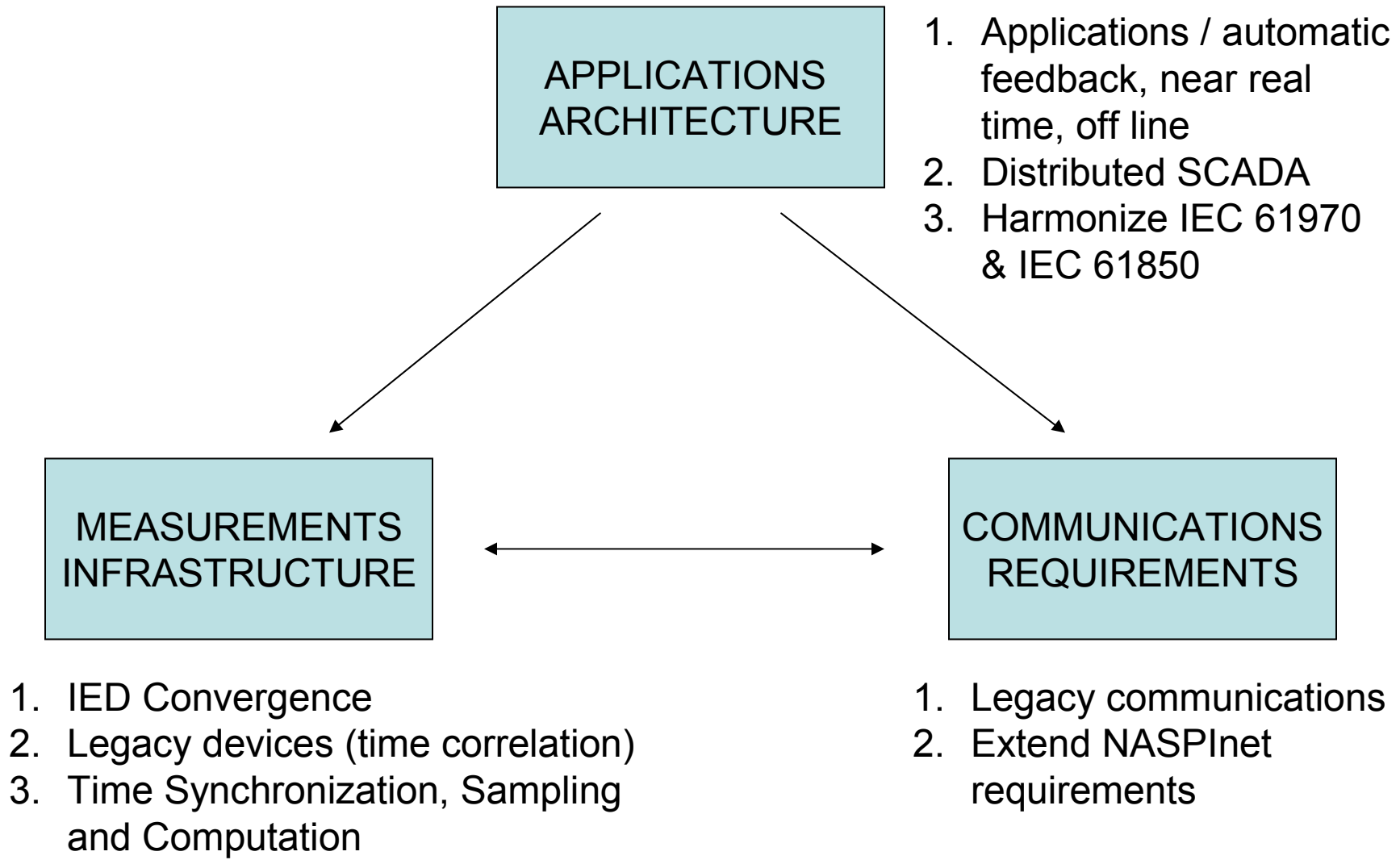
Project Scope

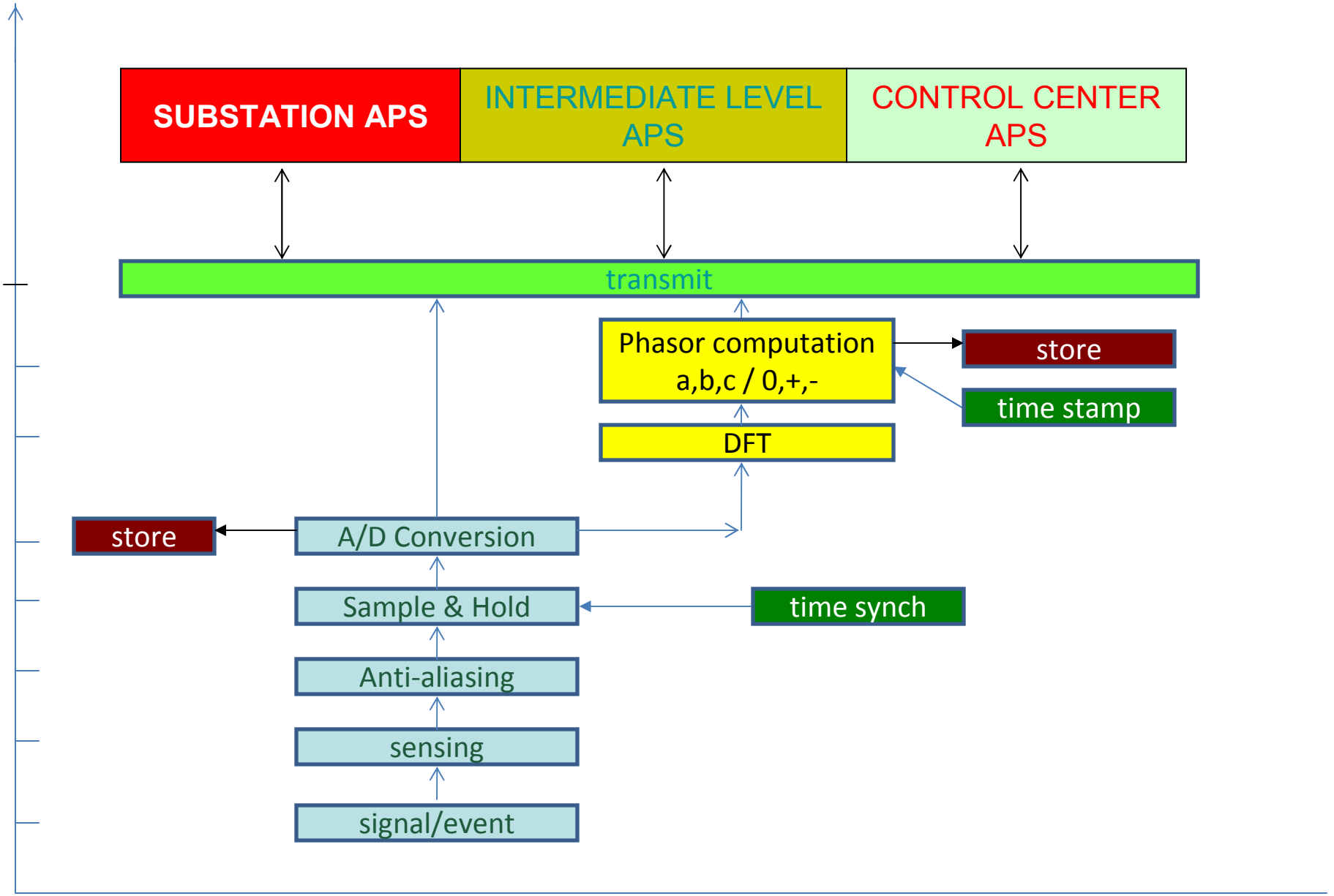
- Coordination and Control of Voltage Profile in the NYCA Grid
- Enhanced Situational Awareness Against System Vulnerabilities in the NYCA Grid
  - *Real-Time System Visualization;*
  - *Enhanced State Estimation;*
  - *Voltage Stability Monitoring;*
- Dynamic System Model Calibration
- Controlled System Separation

Improved Voltage Control

- Add 950 MVAr of Smart Grid enabled capacitors;
- Based upon recent studies by ABB and NYISO;
- Collaborate with TOs & use OPF to optimize siting; and
- Collaborate with TOs to develop operational protocols.
- Anticipated benefits from reduced system losses
  - *~$9.7M energy savings annually; and*
  - *CO_2 reductions of ~58,440 tons annually.*



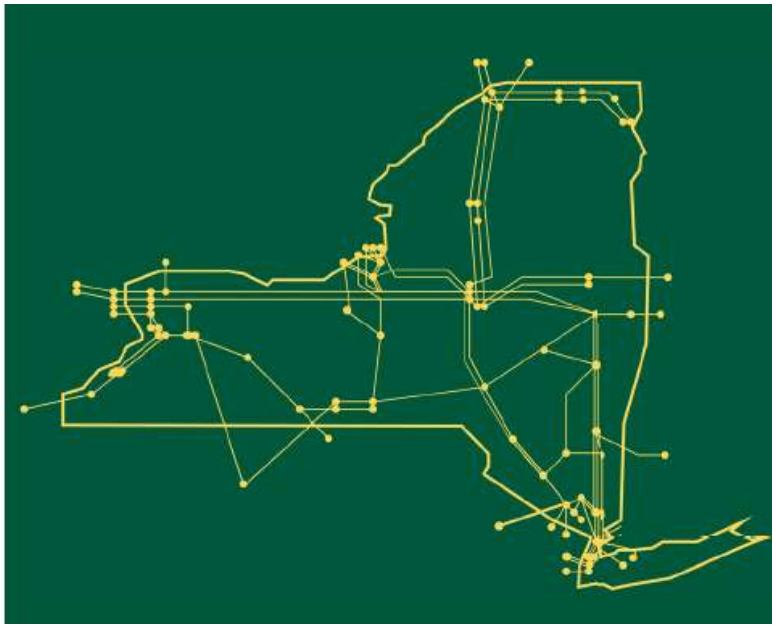




Continuous Learning

- Strong Collaboration with US and International R&D
  - *EPRI, PSERC, PSRC, CEATI, ….*
  - *NYSERDA, IRC*
  - *Lund University*
  - *NY Smart Grid Consortium*
  - *Brookhaven National Labs*
  - *Technical Exchange with Int'l ISOs*

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and conducts comprehensive planning for the state's bulk electricity system.



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Real-Time Visualization

- Suite of System Operator tools to monitor and appropriately alarm for conditions pertaining to:
  - *Real time dynamics, wide area monitoring;*
  - *Voltage stability analysis;*
  - *Oscillations and mode;*
  - *Phase angle and angular separation; and*
  - *Frequency, voltage and power flows;*
- Implement phasor-assisted state estimation

Controlled System Separation

- Collaborative effort with TOs and NYSRC;
- Develop system baselines and identify indicators for conditions warranting separation;
- Identify transmission system separation points;
- Develop criteria to trigger and protocols to administer system separation;
- Develop process(es) for recovery from separation; and
- Identify requirements for implementation.

Model Calibration

- Gather data from existing IEDs to identify events for near-term model validation;
- Provide input into siting and configuration of additional IEDs to support model calibration;
- Incorporate data from PMUs added through DOE SGIG project and identify additional events;
- Simulate observed events and verify the existing generator and load models; and
- Identify opportunities to improve system models.

Best Practices for IED Integration

- The influx of digital processing embedded within the power grid compels a system of systems approach to the integration of utility applications with plant, substation, and field devices.
- Secure communications with sufficient bandwidth and speed to support expanded situational awareness capabilities and system operations is expensive and can be challenging to administer.

Best Practices for IED Integration

- Complexity and cost of the data management solutions to support applications with varying sampling rates, communications latency, error rates, and archival requirements have grown exponentially.
- Technology and application development has outpaced the adoption of industry standards.

Best Practices for IED Integration

- NYISO intends to collaborate with the NY TOs to develop a strategy that provides for a managed, timely migration to a system of systems approach to IED integration.
- Actively engage in NASPI, NIST, NAESB, NERC, IEEE, and EPRI efforts to identify and timely adopt interoperability and architectural standards.
- Prepare for the point in time when the substation RTU becomes the 8-track tape of the SCADA domain.