

Special Protection System

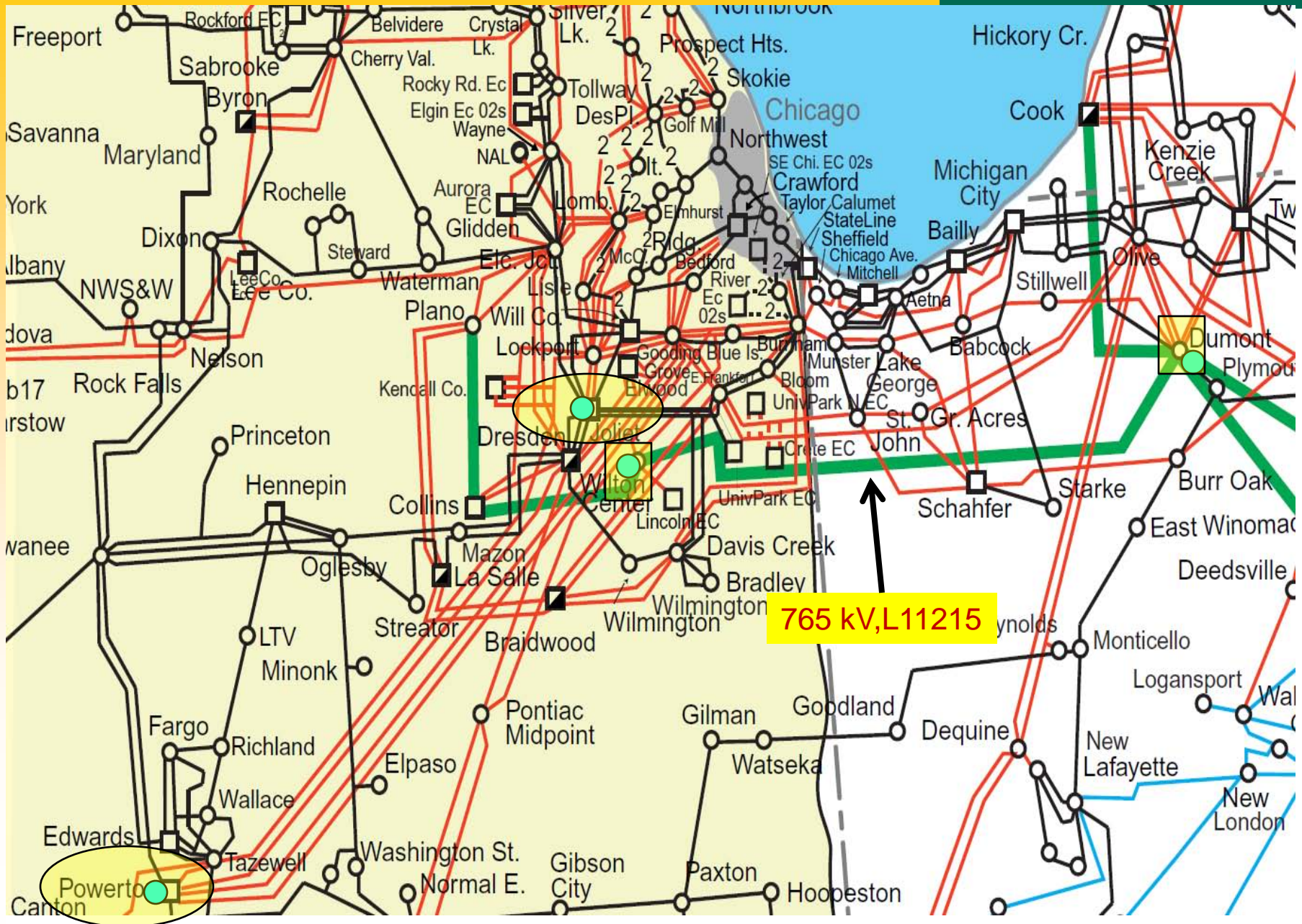
Powerton/Joliet SPS



Powerton/Joliet SPS Goals

- **Relieve Congestion during Off Peak Periods**
 - Significant addition of wind capacity adds to off-peak congestion and will increase as more wind is added
 - Dumont-Wilton Center line (L 11215) is the most frequent contingency for congestion in Northern Illinois
 - Congestion caused by this contingency is in the range of \$40 to \$60 million/year)

- **Reduces Volatile Operational Issues**
 - Off-peak, congestion has created significant swings in generation dispatch in the western PJM region
 - Coal generation is forced to dispatch up and down multiple times in a day and often shut down for economics
 - This jeopardizes the reliability of the units. Frequent cycling increases forced outages and adds risk of tripping during periods of peak summer demand



765 kV, L11215

SPS is Temporary Until Upgrades are Complete

Upgraded Facilities List from V3-052			
Item	Element	Estimated Mitigation	Transmission Owner
1	Burnham substation	Replace line trap Munster relay upgrade	ComEd NIPSCO
2	Crete-St. John 345kv Tap	Reconductor 345kv L94507	ComEd
3	East Frankfort-Crete 345kv	Reconductor 345kv L6607	ComEd
4	Marengo-Pleasant Valley 138kv	Reconductor 138kv L12204 and replace relays	ComEd
5	Burr Oak 345kv substation	New circuit breaker and associated bus work	NIPSCO
6	Burr Oak 345/138kv transformer	Transformer, 138kv CBs, 345kv MOD replacement, relay replacement for transformer and Cir. 34513	NIPSCO

SPS Operation Security :

- SPS was designed to be highly secure with a concentration to prevent misoperations during **any** peak condition:
 - Calculations and actions are performed independently at each generating plant
 - Telemetry data is collected from both AEP and ComEd and must be validated
 - SPS must be armed prior to issuing a trip command

- **ARMING:**
 - System is enabled by order from PJM Dispatcher
 - ComEd area load below 15,000 MW
 - ComEd **and** AEP telemetry agree that L.11215 has flow in excess of 500 MW in the Dumont direction

- **TRIP COMMAND:**
 - ComEd **and** AEP telemetry agree that L.11215 has tripped open and locked out
 - L.11215 verified approximately 0 MWs (at both ends of line)
 - System is in an “ARMED” state when line lock out occurs

SPS Operation Security :

- SPS Action:

When a trip command is generated within the PLC logic, the follow actions will be taken:

- Trip Powerton, Unit 5 (770 NMWs) from independent PLCs hardwired into each generator's trip busses (System 1 & System 2)
- Trip Joliet, Unit 7 (520 NMWs) from independent PLCs hardwired into each generator's trip busses (System 1 & System 2)

SPS Input Data Sources

- The input data is derived from the current telemetry available from the existing energy management systems (EMS) at ComEd, AEP, PJM and EME
- No additional equipment needs to be installed at Wilton Center and Dumont
- The SPS scheme uses the same information collected over the same communication paths that are used to run the real-time contingency evaluations at ComEd, AEP, and PJM

SPS Implementation Plan

Scheme will be redundant

- Two PLCs at each generating station performing identical calculations
 - SEL 3530 RTACs will be used
 - Devices will be powered by existing unit protection power
 - Devices will be installed in existing generator protection panels

- Input Data Communications
 - Uses existing dual path IP networks.
 - Primary is a dedicated frame relay network
 - Backup is corporate network

- Output Trip Signals
 - Each PLC will be hardwired to independent trip buses for each unit

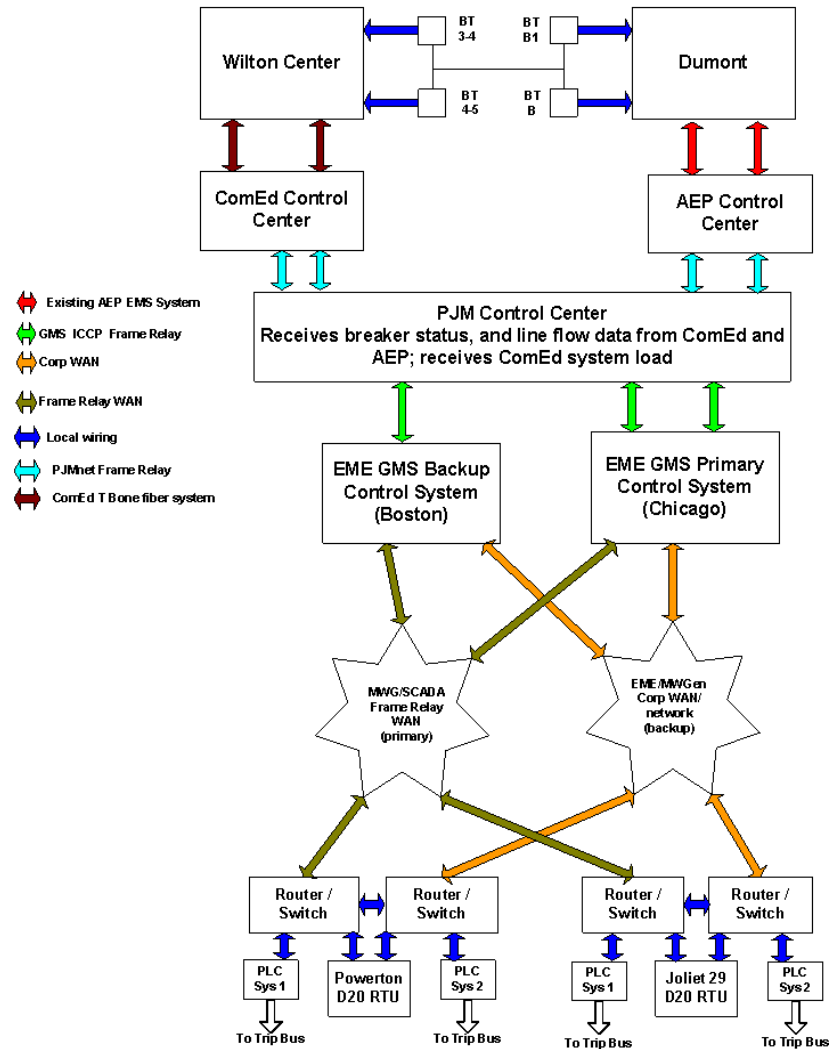
SPS Communication Design Features

Uses complete redundant systems for all data communication:

- ComEd “T-Bone” system (fiber) between Wilton Center and ComEd EMS center
- AEP communication system between Dumont and AEP EMS center
- Communication paths between ComEd and PJM (PJMnet Frame Relay)
- Communication paths between AEP and PJM (PJMnet Frame Relay)
- Communications paths between PJM and EME (GMS ICCP Frame Relay)
- Communication paths between EME and plants (GMS ICCP Frame Relay)

Simplified Communication Path Map

Communication Routing



Question?

Thank You!