

**NYSRC Defensive
Strategies Working
Group**

February 11, 2010

@NYSERDA

Agenda

- **Opening Remarks (10:00)**
- **Presentaion by Roy Moxley of SEL (10:15)**
 - Phasor Data Sources
 - Accuracy Issues
- **Lunch (12:00)**
 - Signal processing and timing issues
- **Phone Connection w. Armando Guzman & Scott Manson of SEL (2:00)**
 - Wide area protection concepts
 - Overview of SEL's WAPS (SIPS) Installations
 - Overview of SEL's system analysis and simulation capability
 - Thoughts on applicability of WAPS to Eastern Interconnection?
- **General Q&A**
- **Other Business**

Suggested Reading

- **Performance of Relaying during Wide-Area Stressed Conditions**, IEEE PSRC, WG C12, May 14, 2008
- **Development of New SIPS will provide for superior management of System Disturbances**, Miraslav Begovich of Ga Tech, cover story PAC Magazine, Autumn 2009
- PAC Magazine – Protection Automation & Control

SIPS

- **System Integrity Protection Scheme**
 - Goal is to improve security of the power system
 - Encompasses SPS, RAS, UFLS, UVLS, OOS
 - Includes interface with SCADA
 - hierarchical architecture, communications, processing
 - Use of phasor measurements offers advantages, simplicity
- vs **Traditional protection schemes** which focus on a specific piece of equipment

Out of Step - Phase Angle Difference

2.12. When an unstable condition exists in the power system, one equivalent generator is out of synchronism with the other equivalent generator of the system. We refer to this condition as an out-of-step (OOS) condition of the power system.

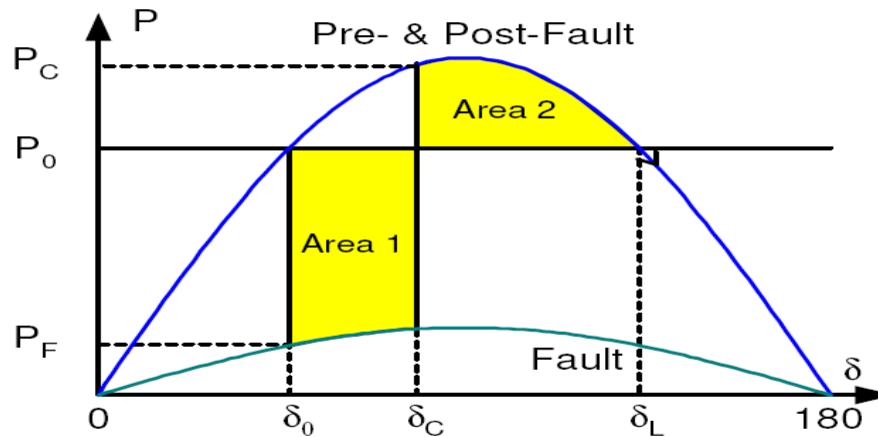


Figure 2.12 A Transiently Unstable System



8.50 x 11.00 in

PSB and OST

- **PSB - Block relay elements prone to operate during power swings**
 - Both stable **and** unstable Swings
 - Allows tripping for faults
 - Blocks tripping for disturbances
- **OST - Differentiate between stable and unstable swings**
 - Initiate system separation in anticipation of or during **unstable swings**
 - Initiate system separation **at appropriate phase angle**
 - (note - uncontrolled tripping can cause equip damage, pose safety concerns and further contribute to cascading outages)

Defensive Strategies – Potential Mitigations

- **Supplement existing transmission line protection schemes** to enable reliable formation of islands or separations
- **New protection systems** capable of detecting abnormal system conditions and initiating actions that would prevent or mitigate the impact of major system disturbances.
- **Improved coordination** of the UFLS program, transmission system protections, and generator protections
- **Improved coordination** of protections and control functions