

2017 NSF Principal Investigators Meeting  
Mini-Workshop Session

# Smart Grid Resiliency and Security

**Organizing Committee:**

Anu Annaswamy (MIT), Rakesh Bobba (OSU), Aranya Chakraborty (NCSU)  
Sajal Das (MST), Alefyia Hussain (USC), Mani Govindarasu (ISU),  
Lalitha Sankar (ASU), Bruno Sinopoli (CMU)

Report-back by Kate Davis (TAMU)

# Smart Grid Resiliency and Security Mini-Workshop Session

## A G E N D A

- 8:30 AM Welcome to the Mini-workshop  
*Anuradha Annaswamy (MIT)*
- 8:35 AM Tutorial: The Electric Grid 101  
*Lalitha Sankar (ASU) and Rakesh Bobba (OSU)*
- 8:50 AM A Brief Overview of the NSF CPS Energy Portfolio  
*Sajal K. Das (MST)*
- 9:00 AM Roundtable Discussion with Craig Miller (NRECA)  
Author of NAESM Committee Report on *Enhancing the Resilience of the Nation's Electricity System*  
*Moderator: Anuradha Annaswamy (MIT)*
- 9:30 AM Panel: Challenges and Directions to Achieve Grid Security  
*Moderator: Bruno Sinopoli (CMU)*  
*Panelists:*
- |                         |                                    |
|-------------------------|------------------------------------|
| Sonja Glavaski (ARPA-E) | Manimaran Govindarasu (Iowa State) |
| Eric Harper (ABB)       | Robin Podmore (IncSys)             |
| Anurag Srivastava (WSU) | Erin Walsh (DHS)                   |

# Roundtable Discussion with Craig Miller (NRECA)

## *Enhancing the Resilience of the Nation's Electricity System*

- Reliability  $\neq$  Resiliency
- Reliability  $\rightarrow \leftarrow$  Resiliency
- We need to ride through and quickly recover from failure
- Need graceful degradation approach
  - There's no "CTL-ALT-DEL" in the power grid
  - Current defense mechanism is to blackout before damage
- Cyber Mutual Aid after a cyber attack

# Panel: Challenges and Directions to Achieve Grid Security

Sonja Glavaski (ARPA-E)

Manimaran Govindarasu (Iowa State)

Eric Harper (ABB)

Robin Podmore (IncSys)

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Erin Walsh (DHS)

- The cost of an attack can be trillions of dollars
- Need for faster-than-real-time simulations of entire system
- Operational paradigm shifts
  - Reliability to resiliency
    - Run at full capacity
    - Take actions to recover quickly
  - Fault resiliency to attack resiliency
- Jointly design, analyze, and operate transmission, distribution, and communications
- The threat landscape is dynamic
- Need definitions and metrics for resiliency
- Model impact to societal functions and services

# Key takeaways

- How do we design and operate systems for resiliency?
  - Metrics
  - Tradeoff between reliability and resilience
- How do we design systems to move from fault resilience to attack resilience?
- How do we simulate T&D&C (transmissions, distribution, communications) faster than real time?
- How do we design and operate an open Android-like platform for power system operations?
  - Cyber-Mutual Aid

Is winter coming?

More creative failures than ever before. Spring will follow.