U.S. DEPARTMENT OF ENERGY | Office of ELECTRICITY

Secure Grid Communications

Electricity Advisory Committee Discussion

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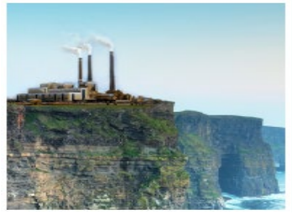
Growing Asset Stress



- New operating paradigms
- Lower system inertia
- Aging infrastructure
- Fewer power engineers

Increased Variable Generation

- More dynamic behavior
- More stochastic
- Multi-level coordination

More Dynamic Markets

- Broader markets & more services
- Greater complexity
- More frequent clearing

New Controllable Assets

- Demand response
- Energy storage / electric vehicles
- Dynamic T&D assets

Increased Activity at the Grid Edge

- Load growth
- Distributed energy resources
- Internet of (energy) things

Massive Data & Computational Advances

- AI & machine learning
- New control paradigms
- Fast computation
- Cloud computing
- Probabilistic methods

Thesis

(a core proposition we believe to be true)

The next-generation power grid will be an information network as much as it is an energy network.

Vision

(the normative state of the world we want to achieve)

Data and information essential to reliable, resilient grid operations are delivered accurately to the right place, at the right time, without interference.

Grid ←→ Comms Interdependencies

- DER use cases
- Restoration use cases
- *Challenge:* Grid traffic prioritization & coordination

Grid Edge Integration

- Rapid transformation at the edge
- *Challenge:* Operational coordination & orchestration

Secure Communications Interoperability

- Heterogeneous industry & regulatory landscape
- Disparate technology generations
- *Challenge:* End-to-end information security

Relevant OE Projects

Communications Architecture Development

Problem: Accelerating digital grid technology deployment without a harmonized vision for supporting communications infrastructure

Description: Identify gaps in grid communications architectures to meet data transport requirements and ensure information security for high DER and electrification scenarios. Develop a roadmap for future communication technology development.

Secure Pathways for Resilient Communications (SPaRC)

Problem: Vulnerabilities to information security in the communications paths used for grid operations

Description: Investigate the capabilities of grid communications technologies and systems to meet the information requirements of new sensing, control technologies, and operations; identify gaps; and develop solutions.

Center for Alternate Synchronization & Timing (CAST)

Problem: GPS signals used for grid synchronization can be blocked or spoofed

Description: Perform research, development, testing, evaluation, and technical assistance to develop and validate resilient timing and synchronization for the power grid.