Autonomous Tools for Attack Surface Reduction

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Motivation
- The electric grid’s attack surface continues to grow with increased interconnectivity and automation encompassing the enterprise, control center, substations, and even beyond.
- Recent attack in Ukraine targeted critical distribution control center servers through SCADA VPN and expanded its impact to target field devices at substations to create a regional blackout.
- Current energy delivery systems utilize static and monolithic architectures, configurations, and communications that make attacks against EDS systems more predictable.
- There is a lack of clear metrics and tools to assess the grid’s continually expanding attack surface.
- There is also a need for automated approaches to reduce the attack surface at multiple layers including control center, substations and the wide-area SCADA communication networks.

Project Objectives

Phase I:
- Develop an integrated framework that continually assesses and autonomously reduces the attack surface for the power grid control environment.
- Develop attack surface analysis techniques, metrics, and tools that assess the attack surface at multiple levels including the control center, substations, and the SCADA network.
- Develop attack surface reduction techniques and tools that dynamically reduce attack surface and hence increase attacker’s cost without interfering in the critical functions of the system.
- Prototype, implement, and evaluate the techniques and tools on a realistic industrial CPS security testbed environment leveraging the unique resources of the team.
- Develop a Commercialization plan to transition the developed tools into power system industry stakeholders for a broader adoption.

Phase II:
- Field demonstration, verification, and evaluation of the effectiveness of the attack surface analysis and reduction techniques on a realistic utility testbed environment.

Research Tasks

Alignment with DOE Roadmap

Testbed-based Implementation & Evaluation

Commercialization & Demonstration
- ISU will work with Alstom, SnoPUD and other partners to develop a commercialization plan in the last quarter of Year 2 in the project.
- Year 3 includes field-testing and demonstration of capabilities with major involvements from our industry partners ALSTOM and SnoPUD.
- Alstom will co-lead the effort to integrate the attack surface analysis and reduction tools into their SCADA/EMS tool chain.
- SnoPUD will co-lead the effort to deploy the attack surface reduction tools into their Test and Live SCADA environment, and utilize them for testing.