CPS: Small: Collaborative Research: CYDER: CYbersecure Distribution systems with power Electronically interfaced Renewables

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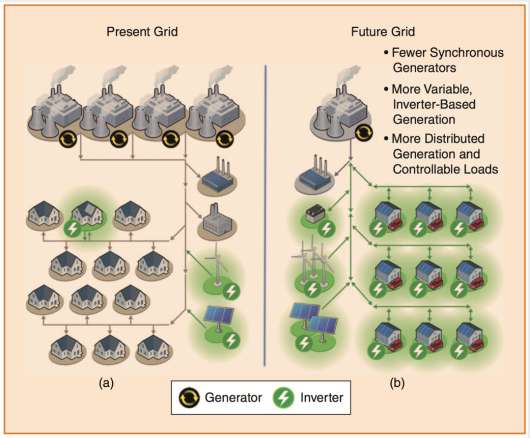
1 Description

Modern distribution systems with embedded renewables are more prone to cyberintrusions and their adverse impacts because

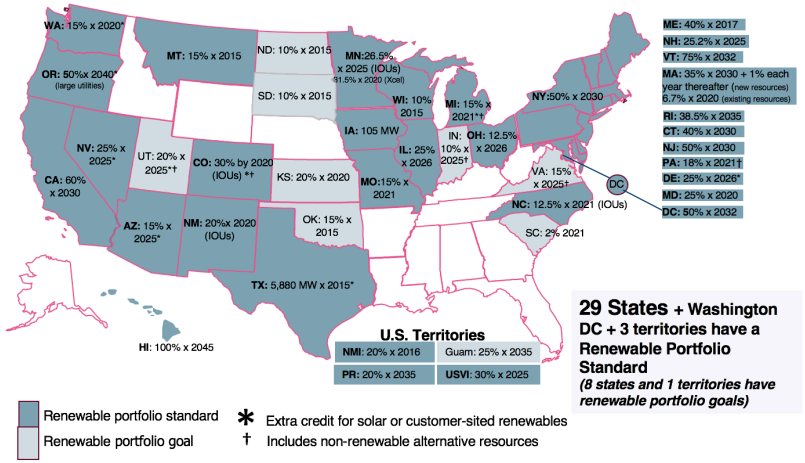
- There is wider utilization of communications;
- The system may be smaller and more sensitive, specially in microgrid configurations;
- The power electronics-based inverters used to interface renewables are more sensitive.



Goals

We design a new comprehensive methodology for cybersecurity monitoring and mitigation in systems with a multitude of dynamical devices.

- Enable **defense** against cyberintrusions in a smart distribution system;
- Create **supercontrollers**;
- Analyze the system and create a **testbed**.

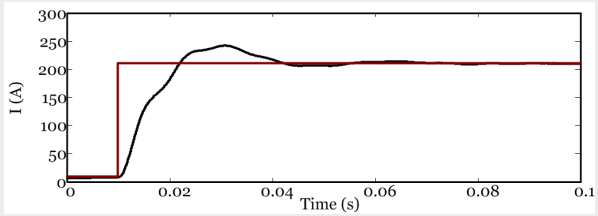


2 Key Findings

Control of Black-boxed and Variable Systems

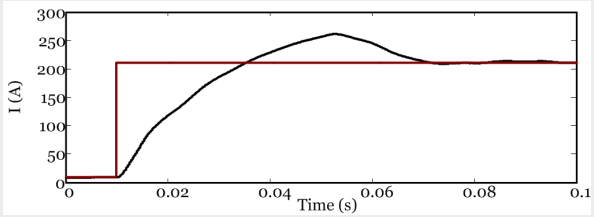
Original System

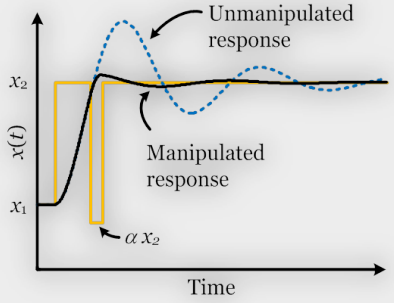
Overshoot: 15%
Settling time: 32 ms



Load Disconn.

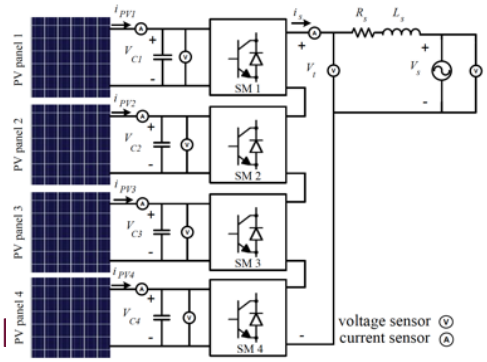
Overshoot: 26%
Settling time: 67 ms





Cybersecurity of Inverter-Based Resources

- Smart devices such as remote controlled switches on a distribution system are created with new intrusion detection capability.
- Multi-agents share information to identify the targets of cyber attacks on smart devices.



testbed and demonstration facility to show the intrusions as well as anomaly detection and defense in a distribution system environment.