

Power Networks with Coupled Control and Data Acquisition System

Amanda M. James

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Abstract

The rapid deployment of smart grid technology is coupling the physical infrastructure of power grids with increasingly complex information technology networks. Smart grid has numerous potential benefits, but this coupling could expose new vulnerabilities. We examine the impact of this coupling in a simple model of a power generation and transmission system connected to a supervisory control and data acquisition (SCADA) network. The power system is modeled as a network with linearized power flow relationships. The SCADA network is modeled as an information network that monitors and controls components of the power network. Failures are injected into the networks, simulating both random failures and directed attacks on either network. We compare the size of the resultant blackouts under two control schemes, with and without optimal emergency control actions.