RWTH AACHEN UNIVERSITY

E.ON Energy Research Center
ACS | Institute for Automation of Complex Power Systems

Master Thesis: Impact Analysis of Cyberattacks on Electric Vehicle Charging Infrastructure on distribution grid reliability.

As documented in literature, cyberattacks on Electric Power and Energy Systems (EPES) such as the one on the Ukrainian Power Grid can have wide-ranging consequences. Such consequences can include but are not limited to loss of life and property and blackouts. There is an increased integration of Electric Vehicle Charging Infrastructure (EVCI) in distribution grids due to the need for transportation electrification. Although the impact of this integration in terms of additional load due to Electric Vehicle (EV) charging on EPES performance has been widely studied in literature, less attention has been paid to the cyber-vulnerabilities associated with EVCI and the impact of exploiting these vulnerabilities on the EPES.

EVCI includes not only the Electric Vehicles themselves, but also Electric Vehicle Supply Equipment (EVSE) and Charging Management Systems, each of which present distinct cyber-vulnerabilities. The aim of this thesis is to analyse the impact of selected cyberattacks on the performance of the distribution grid. As a part of the thesis you are required to perform the following tasks

1. Conduct a literature review on documented cyber-vulnerabilities and threats associated with EVCI.
2. Mathematically model one cyberattack frequently documented to occur on EVSE.
3. Conduct a literature review on reliability indices for the power grid.
4. Perform simulations of the distribution grid with EVSEs under normal operating conditions and under a cyberattack.
5. Analyse the reliability of the grid based on the performed simulations.

Note: The thesis can be also offered as a Bachelor thesis with reduced scope of work.

Your Profile:

1. Master student in Electrical Engineering with a background in Power Systems/Communication Systems
2. Good knowledge of Python and power system automation
3. High motivation to work independently and
4. Interest in inter-disciplinary research topics

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