

### **Cyberattack vulnerabilities on Microgrids.**

Smart grids are upgraded versions of traditional electric grids, equipped with advanced technologies like sensors, communication networks, operations automation. With this new upgrade, comes cyberattack vulnerabilities, A successful cyberattack on smart grid can have significant consequences on the power system and the community it serves such as power outages, financial losses, safety risks and national security risks, etc.

Most of the grid's vulnerabilities are caused due to **Communication Networks** where Modern grids are equipped with multiple communication technologies, which create a challenge to implement a global cybersecurity policy. Plus, in recent years there has been an increase in communication to external networks for data exchanges to maintain performance. However, it creates a vulnerability on exchange communication line. Besides, more vulnerabilities are introduced by internet exposure, where internet provides real-time data to grid like weather forecast and fuel prices for optimal energy management and profits. According to a report by Idaho National Laboratory, A survey composed of electric utility respondents, found 41 percent of total security incidents were related to insecure IT network

(<https://www.energy.gov/policy/articles/cyber-threat-and-vulnerability-analysis-us-electric-sector>).

Another major cause for grid vulnerability is **Automation Devices**. The main advantage of automation is it increases the efficiency of operation and eliminated human-error factor. However, these devices have communication capabilities over network, which makes this device prime targets for attackers to gain access to control systems. In an attack in 2016 on Ukrainian power grid, attackers send malware through emails to power grid workers, through network they were able to access critical control systems lead to power outage for six hours. (<https://www.cisa.gov/news-events/ics-alerts/ir-alert-h-16-056-01>).

Application of Machine Learning in Cyberattack detection on Microgrids.