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Centre for intelligent electricity distribution
- to empower the future Smart Grid

PhD: Reliability Evaluation of Modern Distribution Systems

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Motivation

With higher penetration of smart components and new technology such as flexible resources, distributed generation, and ICT, the distribution systems experience an increased complexity. This will change the behavior of the distribution system and will therefore require new ways of analyzing the network.

Objectives

- Build a foundation for how to model and calculate the reliability of electricity supply in the future distribution system.
- How will microgrids, flexible resources, and distributed generation influence the reliability of electricity supply in the distribution system?
- How will ICT components influence the reliability of electricity supply in the distribution system?

Methods/Approach

- A reliability assessment tool for modern distribution systems (RELSAD) is developed. Based on sequential Monte Carlo simulation.
- The tool is built based on object-oriented programming with structure seen in Fig. 3.
- Use the backward-forward sweep concept to calculate the electrical consequence.
- Optimization formulation for minimizing shedding in the network based on CENS.

Current research topic

The work has been focusing on building a method to calculate the reliability in a modern distribution system. In this relation, RELSAD was developed and will be published.

The current research is based on investigating the effect and changes different technologies such as ICT, flexible resources, and DGs impact the reliability of electricity supply in distribution systems.

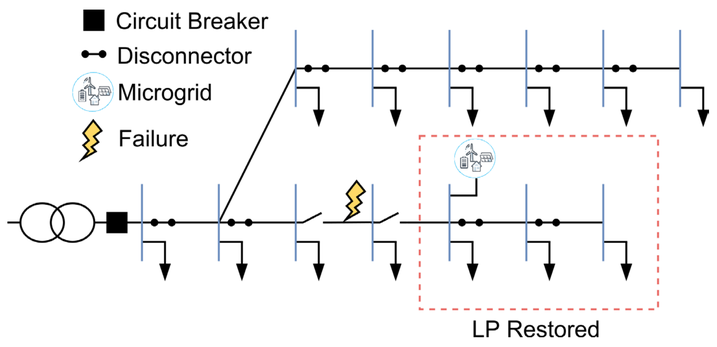

Fig. 1: A distribution system with restored load points when the microgrid, DG, or flexible resource is islanded with the disconnected distribution system.

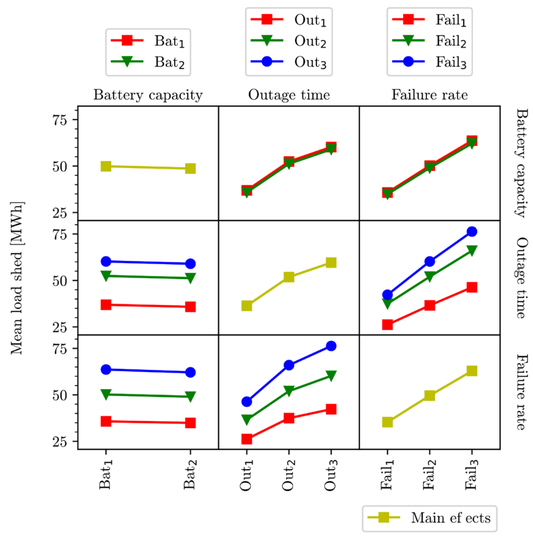

Fig. 2: Interaction plot of the reliability of supply of a distribution system with microgrid

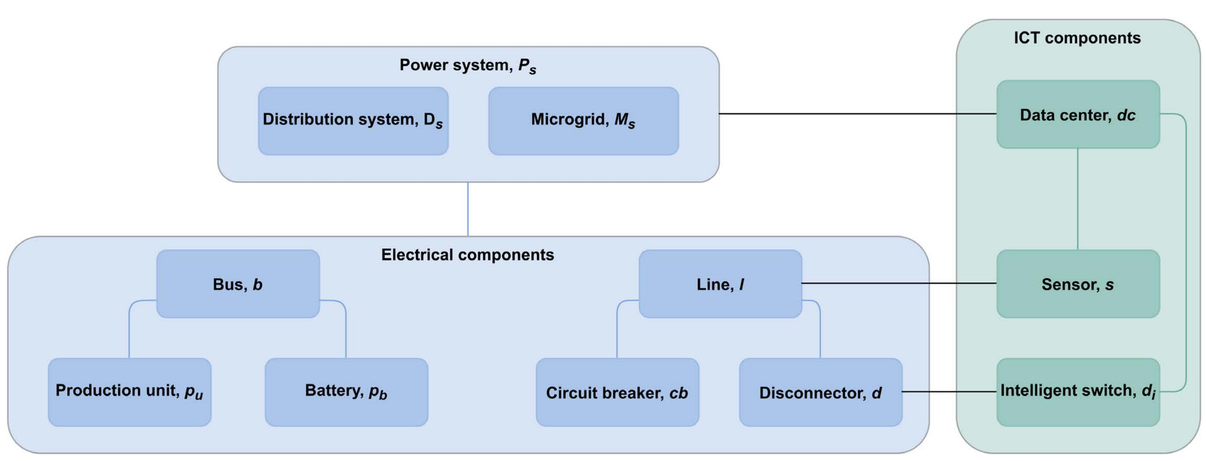

Fig. 3: The component structure of the RELSAD tool.

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