A cooperative multiagent framework for self-healing mechanisms in distribution systems

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Abstract:

Because of society’s full dependence on electricity and high cost of system outages, one important goal is to increase the reliability of the power system, which means that a salient attractive feature of smart grid is its self-healing ability. Smart grids will develop and enhance the automation of distribution by operating in a distributed manner through new digital technologies such as monitoring, automatic control, two-way communication, and data management. In this work, the smart grid concept and technologies have been applied to construct a self-healing framework for use in smart distribution systems. The proposed multiagent system is designed to locate and isolate faults, then decide and implement the switching operations to restore the out-of-service loads. The proposed control structure has two layers: zone and feeder. The function of zone agents in the first layer is monitoring, making simple calculations, and implementing control actions. Feeder agents in the second layer are assigned to negotiation. The constraints include voltage limits, line current limits, and radial topology. Load variation has been taken into consideration to avoid the need for further reconfigurations during the restoration period. The results of the simulation conducted using the new framework demonstrate the effectiveness of the proposed control structure.

Keywords:

Distributed control, distribution system, fault location, multiagent, service restoration, smart grid

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