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ADAPTIVE PROTECTION FOR DISTRIBUTED GENERATION BASED NETWORKS USING WIDE AREA PROTECTION SYSTEM

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As a result of deregulation of the electricity market, recent trends are towards the integration of distributed generation (DG) resources into distribution networks to provide local generated power at the load centers to form a smart grid. However, the increasing penetration of DG into distribution networks introduces many significant impacts on the performance of the existing switchgear and protection systems. In this paper, the impacts of DG on different protection systems in distribution networks are studied. Solutions for these protection system challenges are introduced using modern Wide-Area Protection (WAP) system. Proposed WAP system is presented and applied on a case study for a distribution network including DG. Then, an adaptive protection algorithm is developed in order to provide basis guidelines to restore the reliability of the existing protection system and prevent maloperation due to the changing nature of the DG resources. ETAP software is used in order to model the system and perform load flow and short circuit calculations for different system configurations. Finally, setting groups corresponding to each network configuration with the presence of DG are constructed which achieves the required improvement of the protection system performance.

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