

COORDINATED PROTECTION, CONTROL & AUTOMATION SCHEMES FOR MICROGRIDS

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ABSTRACT

Widespread concerns over the environmental impact of traditional transmission connected thermal generating units are driving the installation of a significant level of generation within distribution networks. The term microgrid refers to the coordinated grid integration of distributed and microgeneration within the lower levels of the distribution network, facilitated through the formation of semi-autonomous zones covering a relatively small geographical area. Such a paradigm shift raises important issues surrounding the operation and protection of a potentially fragmented active network. The need to accommodate significantly varying primary network conditions, minimise customer interruptions, and harness the ancillary benefits of distributed and microgeneration are all fundamental to solving the aforementioned issues. This paper presents the results of research aimed at developing practical protection, control and automation schemes for microgrids. The key issues for protecting low voltage networks operating with the microgrid paradigm will be given, and will draw strongly on representative examples from distribution systems found within the United Kingdom. Several schemes will be outlined and demonstrated covering both urban and rural applications. The major functional elements of the schemes will be shown in detail, including: the interface, network, microgenerator and consumer protection. In addition to illustrating the core protection functionality, attention will be directed towards the benefits obtainable from closely coordinating these functions with that of network automation.