

Article Abstract

Title:	Optimal capacitor placement in smart distribution systems to improve its maximum loadability and energy efficiency
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Abstract:	An energy efficient power distribution network can provide cost-effective and collaborative platform for supporting present and future smart distribution system requirements. Energy efficiency in distribution systems is achieved through reconfiguration of distributed generation and optimal capacitor placement. Though several techniques have been reported earlier for optimal capacitor placement, this paper presents an improved technique based on combining Power Loss Index (<i>PLI</i>) and Maximum Loadability Index (<i>MLI</i>). It takes care of critical compensation to maximize loadability and loss reduction. Improved performance results of the new technique have been demonstrated on an IEEE 15 bus distribution system for different load models. It is demonstrated that the load models have significant effect on selecting the capacitor size. The improvement in the loadability limit in constant impedance loads and the reduction in power loss in constant power loads is more than any other load models. The simultaneous improvement in loadability limit and loss reduction enhances energy efficiency in distribution systems by releasing power demand and feeder capacity.
Keywords:	Critical Compensation, Load Models, Maximum Loadability, Optimal Capacitor Placement, Power Loss Index.