

Preface

Variable-power distributed energy resources, such as solar photovoltaic and storage systems, and high-power elastic loads, such as electric vehicle chargers, are being installed at a phenomenal rate in power distribution systems. Such active end-nodes can affect the reliable operation of the grid if they are not controlled properly. Yet there is no consensus among various stakeholders in the power industry on the significance and impacts of these cutting-edge technologies. This brief focuses on the challenges of integrating active end-nodes into low-voltage distribution grids and the potential for pervasive measurement and control to address these challenges. A mathematical framework is presented for the joint control of active end-nodes at scale, and it is shown through extensive numerical simulations that proper control of active end-nodes can significantly enhance reliable and economical operation of the power grid.

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into Distribution Grids

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