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Resilient Distribution Systems

Traditional distribution system engineering is not developed to handle extreme events. The same is true for widely adopted distribution system reliability indices. New methodology and metrics are needed to provide resilience and sustain critical services following catastrophic outages. To this end, microgrids can serve as a resiliency source for the distribution system hosting the microgrids. In this presentation, the role of microgrids as a resiliency source will be discussed. In addition to serving critical load in the distribution system, microgrids can provide black start power for the transmission system. In an islanded mode without support from the utility system, a microgrid needs to be able to maintain stability with respect to disturbances. As a cyber-physical system, the dynamic performance of a microgrid depends on the communication latency as well as the data acquisition cycle time. In the future grids with high penetration of renewable and energy storage facilities, microgrids play a critical role in supporting operation and control of the transmission and distribution systems.

Chen-Ching Liu is American Electric Power Professor and Director, Power and Energy Center, at Virginia Tech, USA. During 1983-2017, he was on the faculty of University of Washington, Iowa State University, University College Dublin (Ireland), and Washington State University. Professor Liu received an IEEE Third Millennium Medal in 2000 and the Power and Energy Society Outstanding Power Engineering Educator Award in 2004. In 2013, Dr. Liu received a *Doctor Honoris Causa* from Polytechnic University of Bucharest, Romania. He chaired the IEEE Power and Energy Society Fellow Committee, Technical Committee on Power System Analysis, Computing and Economics, and Outstanding Power Engineering Educator Award Committee. Professor Liu is the U.S. Representative on the CIGRE Study Committee D2 - Information Systems and Telecommunication. He was elected a Fellow of the IEEE, Member of Virginia Academy of Science, Engineering, and Medicine, and Member of the U.S. National Academy of Engineering.