

Two-Level Automatic Voltage Controller using Synchrophasors for Southern California Edison

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Abstract

We are developing a two-level voltage controller for implementation in Southern California Edison (SCE), Los Angeles, CA [1]. The aim of the controller in Fig. 1 is to maintain a near-optimal voltage profile in the transmission network by coordinating discrete reactive power (VAr) control devices in the system. The controller is targeted for implementation in electric power transmission utility companies where most of the voltage controls are coordinated by switching of discrete VAr devices such as shunt capacitor and reactor banks and transformer banks load tap changers (LTCs). By effectively dividing the controller responsibilities between local substation controls and a central coordinator at control center level, the design is aimed at voltage control of large scale power systems. At the local level, the substation controllers maintain their respective substation bus voltages by local power-flow- like computations using mostly local PMU measurements. The central coordinator computes and provides the voltage set-points to the substation controllers and also coordinates by enabling or disabling the local controllers as needed. The controller is being designed towards prototype implementation in SCE, starting with local controllers at specific substations in the first stage. It has been tested on real-time dynamic models using Real-Time Dynamic Simulator RTDS and on large-scale power-flow simulations of SCE transmission network.

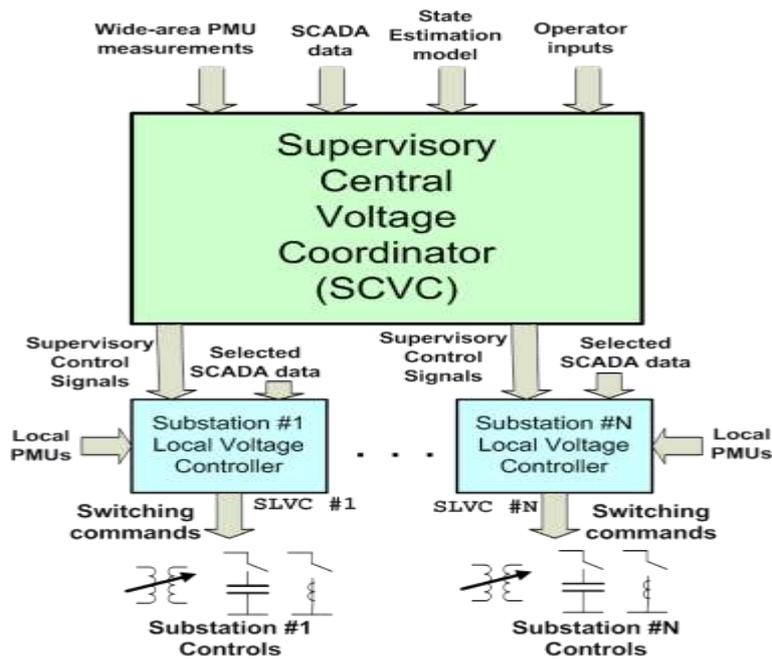


Fig. 1. Overview of the voltage controller [1]

[1] V. Venkatasubramanian, J. Guerrero, J. Su, H. Chun, X. Zhang, F. Habibi-Ashrafi, A. Salazar and B. Abu-Jaradeh, "Hierarchical Two-Level Voltage Controller for Large Power Systems", IEEE Trans. Power Systems, to appear.

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