A Survey Paper on- Analysis of Centralized Control in Micro-Grid

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Abstract— In the context of Electrical Engineerings, the hierarchical control scheme includes three control levels: primary, secondary, and tertiary. These control levels differ in their (i) speed of response and the time frame in which they operate and (ii) infrastructure requirements, e.g., need for communication. This control hierarchy can also be implemented for the micro grid control. The DER units with limited power generation capacity cannot practically assist a strong utility network in its voltage and/or frequency regulation. In the grid connected mode, the host utility may not permit regulation or control of the PCC voltage by the DER units to avoid interaction with the same functionality performed by the grid. The DER units with limited power generation capacity cannot practically assist a strong utility network in its voltage and/or frequency regulation. In the grid connected mode, the host utility may not permit regulation or control of the PCC voltage by the DER units to avoid interaction with the same functionality performed by the grid.

Keywords: DER units, PCC, DVSI, Micro-Grid

I. INTRODUCTION

There is a single point of connection to the main distribution utility called point of common coupling (PCC). SD means a Separation Device that can disconnect MG immediately when a fault occurs in the distribution grid. Some feeders, (feeders 1,2) have sensitive loads, which require local generation. The traditional loads are connected to Feeder 3 and do not have any local generation. Each of the local generation has a LC (local Controller). This is responsible for local control that corresponds to a conventional controller (ex. AVR or Governor) but that has a network communication function to exchange information between other LCs and the upper central controller to achieve an advanced control, The central controller also plays an important role as a central load dispatch control canter in bulk Electrical Engineering, which is in charge of distributed generator operations installed in MG. MG technologies are playing an increasingly important role in the nation's energy portfolio.

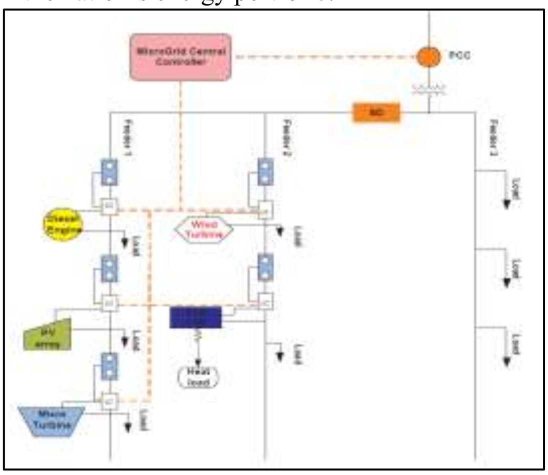

Fig. 1: Micro Grid Architecture.

II. OVERVIEW OF THE CONTROL HIERARCHY

The interconnected Electrical Engineering is spread over a large geographical span. This intricate system can be controlled through either centralized control or decentralized control. A fully centralized control relies on the data gathered in a dedicated central controller and requires extensive communication between the controller and other units. In a fully decentralized control, each unit is controlled by its local controller that is not fully aware of the system-wide disturbances and is independent of other controllers. A compromise between fully centralized and fully decentralized control schemes is the hierarchical control scheme. In the context of Electrical Engineerings, the hierarchical control scheme includes three control levels: primary, secondary, and tertiary. These control levels differ in their (i) speed of response and the time frame in which they operate and (ii) infrastructure requirements, e.g., need for communication.

III. CENTRALIZED APPROACHES

In this situation, there are two ways to control electronic inverter based micro grids: the first is centralized micro grid based on communication links. For example, [46] it offers a new hybrid distributed network-based power control scheme. This scheme contains distributed power regulators that have been mounted on each DG unit to ensure precise tracking of the optimized set points assigned by the central energy management unit (EMU). The measured average power is sent to the EMU in order to calculate the share of each unit based on the real-time optimization criteria. Therefore, a low bandwidth communication link can be used. The proposed structure has good tolerance to communication delays.

IV. LITERATURE REVIEW

This paper presents a dual voltage source inverter (DVSI) scheme to enhance the power quality and reliability of the microgrid system. The proposed scheme is comprised of two inverters, which enables the microgrid to exchange power generated by the distributed energy resources (DERs) and also to compensate the local unbalanced and nonlinear load. The control algorithms are developed based on instantaneous symmetrical component theory (ISCT) to operate DVSI in grid sharing and grid injecting modes. The proposed scheme has increased reliability, lower bandwidth requirement of the main inverter, lower cost due to reduction in filter size, and better utilization of microgrid power while using reduced dc-link voltage rating for the main inverter. These features make the DVSI scheme a promising option for microgrid supplying sensitive loads. The topology and control algorithm are validated through extensive simulation and experimental results. A DVSI scheme is proposed for microgrid systems with enhanced power quality. Control algorithms are developed to generate reference currents for DVSI using

ISCT. The proposed scheme has the capability to exchange power from distributed generators (DGs) and also to compensate the local unbalanced and nonlinear load. The performance of the proposed scheme has been validated through simulation and experimental studies. As compared to a single inverter with multifunctional capabilities, a DVSI has many advantages such as, increased reliability, lower cost due to the reduction in filter size, and more utilization of inverter capacity to inject real power from DGs to microgrid. Moreover, the use of three-phase, threewire topology for the main inverter reduces the dc-link voltage requirement. Thus, a DVSI scheme is a suitable interfacing option for microgrid supplying sensitive loads.

V. Statement of the Problem and Research Objectives

As it was presented in the previous section, each of the existing control schemes suffers from one or more of the following limitations/weaknesses:

– lack of adequate robustness and inability to accommodate microgrid uncertainties
– poor transient performance,
– inability to initiate a black start after system collapse
– dependency on specific microgrid configurations
– coupled real/reactive output power components of DER units,
– relying on a dominant DER unit to regulate microgrid voltage/frequency,
– the need for a high-bandwidth and uneconomical communication link,

VI. Conclusions

A control approach for improving the transient behavior of islanded microgrid is presented. This inverter-based microgrid employs the secondary controller to equalize the amount of active and reactive while restoring the frequency and voltage of microgrid system. This secondary controller is decentralized and each DG has its own secondary controller. Thus there is no need for any high bandwidth communication link and the reliability of system is improved. The feed-forward loop enhance the stability of system by transferring the dominant eigenvalues to the larger values in left half-plan. The scenario based simulation results show the validity of proposed approach using a typical microgrid derived from IEEE 399 Std. and simulated in MATLAB.

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