

Microgrid network architecture diagram

What are the components of a microgrid?

As it can be seen from this figure, the microgrid consists of microgrid central controller (MGCC) or central energy manager, microsource controllers, load controllers, microturbines, fuel cells, battery storage, loads, renewable generators, such as the PV panel and a combined heat and power unit.

How does a microgrid distribution network work?

The source is connected to the microgrid distribution network by an inverter interface through a filter, that is, an inductance-capacitance-inductance (LCL) filter, shown in Fig. 2b. The microsource and load controllers are dedicated controllers for a particular component of the microgrid.

Which approach is applied to microgrids?

After analysing various architectures and models available in the literature, SoSs approach is applied to microgrids. The DERs in microgrid are regarded as subsystems which together constitute an SoS. The fact that microgrids exhibit similar characteristics to SoSs, makes it easier to draft the entire architecture of microgrids in SoSs framework.

What is a microgrid?

In the context of this book, Microgrids are defined as distribution systems with distributed energy sources, storage devices and control-lable loads, operated connected to the main power network or islanded, in a controlled, coordinated way.

What is the basic architecture of a grid system?

The basic architecture of a Grid system is presented in Fig. 1 (a), which shows that a Grid system generally consists of four parts: i) the distribution system, ii) the DG sources, iii) energy storage, iv) control and communications modules. Some of the details of each part of the system are discussed below. Fig. 1.

What are the subsystems of a microgrid?

The microgrid architecture as SoS is depicted in Fig 3. As can be seen from this figure, the subsystems of the microgrid SoS are photovoltaic system, wind turbine and microturbine. There could be other distributed generation units, such as fuel cells and unconventional sources of generation among the subsystems.

A generalised architecture of microgrid is shown in Figs 1 and 2. As it can be seen from this figure, the microgrid consists of microgrid central controller (MGCC) or central energy manager, microsource controllers, load ...

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AC microgrids have been the predominant and widely adopted architecture among the other options in real-world applications. However, synchronizing with the host grid while maintaining voltage magnitude, phase angle, and frequency is challenging. Their efficiency and dependability are also low. Complex architecture and control are required for ...

The new challenge is to accommodate these small-sized renewable energy sources into existing power network. Search for suitable architecture and control schemes is an important area in research, with several people working to find an appropriate solution. AC, DC, and AC-DC hybrid microgrid are some of the architectures proposed in literature.

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Future electricity network must be flexible, accessible, reliable and economically viable to realise the aims of the smart grid initiative. In order to achieve these objectives and to reduce greenhouse gas (GHG) emissions, research on various configurations or architectures of microgrid (µGrid) systems is gaining greater attention.

Hybrid microgrid is the interconnection of AC and DC microgrid(s). Though the network architecture of hybrid microgrid system is complex, it offers pros linked with both the microgrid(s) such as flexibility, increased efficiency and reliability along with economic operation (Fusheng, Ruisheng, & Fengquan, 2016). The hybrid topology facilitates ...

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Hybrid microgrids have the potential to integrate modern DC loads (lightings and EVs) and DERs with existing AC grids. They can increase the power quality and efficiency of the power system. This chapter presents an overview of hybrid AC/DC microgrid and discusses its architecture, modeling of main components, issues, and solutions.

In AC microgrids, loads and distributed energy sources are connected to a common AC bus; DC generating and energy storage units are connected to the AC bus via power converters. In AC microgrids, the frequency and reactive power needs should be controlled while only DC bus voltage control is essential in DC microgrids.

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