

## Solar Energy South Africa

# Microgrid clock synchronization



## Overview

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What happens when a microgrid is synchronized?

Once the microgrid is synchronized, the main grid controls the frequency as presented in Fig. 25. After synchronization, the microgrid and the grid operate in parallel similar to the Grid-connected scenario presented in Sect. 4.1 with the grid supporting both active and reactive power.

How to resynchronize a microgrid?

To resynchronize the microgrid back to the grid, the voltage magnitude, phase angle and frequency of both systems should be within the permissible value recommended by IEEE Standard 1547.4-2011. To balance the voltage magnitude at the PCC for synchronization, switched capacitor banks are connected to provide the required reactive power.

How do tripctl and reclscctl synchronize a microgrid?

The islanding and resynchronization signals are manually controlled by the TRIPCTL and RECLSCTL pushbuttons to demonstrate the synchronization of the microgrid back to the utility grid. Figure 23 shows the frequency, voltage and angle differences of the microgrid.

How do capacitor banks manage microgrid synchronization?

Switched capacitor banks connected at the point of common coupling (PCC) balance the voltage for microgrid synchronization. The results show that the proposed control scheme manages the microgrid in both grid-connected and island modes and improves the system stability and reliability.

What is a microgrid control?

A Microgrid control must regulate the power, voltage, and frequency when in grid-connected or islanded operation within specified thresholds of power quality and reliability. A significant challenge to microgrid implementation is the stable control of voltage and frequency during grid-connected and

islanded operation modes.

How do microgrids work?

Microgrids are operated either in grid-connected mode where power is exchanged with the main grid based on demand and supply [ 3, 4] or in island mode where the microgrid acts as a power hub supplying the loads connected to it [ 5, 6 ].

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### **Droop-Controlled Inverter-Based Microgrids Are Robust to Clock ...**

effect of clock drifts in inverter-based microgrids. Via a suitable model that incorporates this phenomenon, we prove that clock inaccuracies hamper synchronization in microgrids, in which ...

### **GPS Synchronization of Smart Distributed Converters for Microgrid ...**

In this paper, a smart distributed DC/DC converter synchronization advanced technique and phase angle optimization algorithm are proposed using to reduce the DC bus overall ripple. A ...



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