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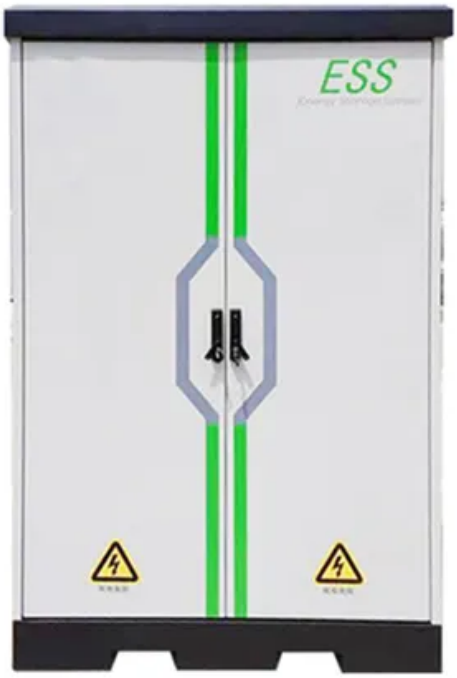
Base station energy management system analysis and optimization



Overview

The explosive growth of mobile data traffic has resulted in a significant increase in the energy consumption of 5G base stations (BSs). However, the existing energy conservation technologies, such as traditi.

How to make base station (BS) green and energy efficient?

This paper aims to consolidate the work carried out in making base station (BS) green and energy efficient by integrating renewable energy sources (RES). Clean and green technologies are mandatory for reduction of carbon footprint in future cellular networks.

What are the components of a base station?

A typical base station consists of different sub-systems which can consume energy as shown in Fig. 4. These sub-systems include baseband (BB) processors, transceiver (TRX) (comprising power amplifier (PA), RF transmitter and receiver), feeder cable and antennas, and air conditioner (Ambrosy et al., 2011).

How many base stations are in a heterogeneous network?

As an example, one can mention the transition from homogeneous networks (comprising 1 to 3 base stations (BSs) per km 2) to heterogeneous networks (comprising 10 to 100 nodes per km 2). Furthermore, the growing need for larger storage capacities adds to energy requirements.

What is a minimal 5G BS energy consumption optimization model?

Therefore, the problem can be formulated as a minimal 5G BS energy consumption optimization model, i.e., the energy consumption reduced by reasonably switching off the idle or lightly loaded BSs and reasonably associate UEs with BSs (i.e., the BS switching state and BS-UE association state scheme).

What is 5G base station?

1. Introduction 5G base station (BS), as an important electrical load, has been

growing rapidly in the number and density to cope with the exponential growth of mobile data traffic . It is predicted that by 2025, there will be about 13.1 million BSs in the world, and the BS energy consumption will reach 200 billion kWh .

What is system optimization?

System Optimization aims at 1) optimization of system capacity of RES, i.e., size of PV array and the wind turbine as well as the battery bank and 2) optimization of energy consumption within system in order to maximize the use of green harvested energy.

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Firstly, a system energy consumption model for UDNs is established, which is divided into two sub-problems based on the final optimization problem, namely base station ...

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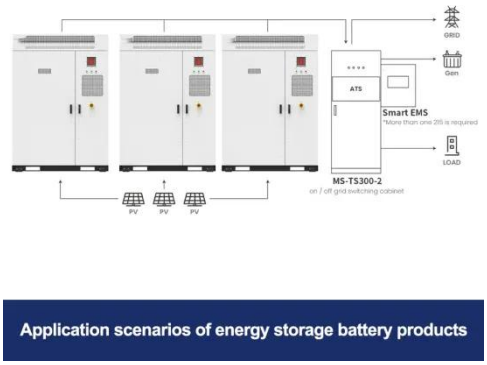

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