SolarTech Power Solutions

Energy Management of Base Stations

Overview

Do cellular network operators prioritize energy-efficient solutions for base stations?

Recognizing this, Mobile Network Operators are actively prioritizing EE for both network maintenance and environmental stewardship in future cellular networks. The paper aims to provide an outline of energy-efficient solutions for base stations of wireless cellular networks.

What are the standardized energy-saving metrics for a base station?

(1) Energy-saving reward: after choosing a shallower sleep strategy for a base station, the system may save more energy if a deeper sleep mode can be chosen, and in this paper, the standardized energy-saving metrics are defined as (18) R i e = E S M = 0 E S M = i E S M = 0 E S M = 3.

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 base station dormancy?

In response to the problem of high network energy consumption caused by the dense deployment of SBS, the base station dormancy technique is seen as an effective solution, as it does not require changes to the current network architecture and is relatively simple to implement. This technique was first proposed in the IEEE 802.11b protocol .

Why do base stations waste so much energy?

When there is little or no communication activity, base stations typically consume more than 80% of their peak power consumption, leading to significant energy waste . This energy waste not only increases operational

costs, but also burdens the environment, which is contrary to global sustainability goals .

How does distributed execution affect base station control?

In the distributed execution phase, each actor network makes decisions independently based only on its own network and observations, and although each actor executes independently, the whole system is able to obtain a better base station control strategy because their strategies are based on the results of global optimization. Fig. 2.

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