

SolarGrid Energy Solutions

Average power consumption of 5G outdoor base stations



Overview

How much power does a 5G station use?

The power consumption of a single 5G station is 2.5 to 3.5 times higher than that of a single 4G station. The main factor behind this increase in 5G power consumption is the high power usage of the active antenna unit (AAU). Under a full workload, a single station uses nearly 3700W.

How does mobile data traffic affect the energy consumption of 5G base stations?

The explosive growth of mobile data traffic has resulted in a significant increase in the energy consumption of 5G base stations (BSs).

Is 5G more energy efficient than 4G?

Although the absolute value of the power consumption of 5G base stations is increasing, their energy efficiency ratio is much lower than that of 4G stations. In other words, with the same power consumption, the network capacity of 5G will be as dozens of times larger than 4G, so the power consumption per bit is sharply reduced.

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 .

Should power consumption models be used in 5G networks?

This restricts the potential use of the power models, as their validity and accuracy remain unclear. Future work includes the further development of the power consumption models to form a unified evaluation framework that enables the quantification and optimization of energy consumption and

energy efficiency of 5G networks.

Does 5G increase energy consumption?

However, this technological leap comes with a substantial increase in energy consumption. Compared to its predecessor, the fourth-generation (4G) network, the energy consumption of the 5G network is approximately three times higher .

Average power consumption of 5G outdoor base stations



5G Thermal Management Strategies: Keeping ...

Feb 12, 2025 · The introduction of fifth-generation (5G) networks has made a change in the telecommunications industry by providing great data speeds,

...

Optimization Control Strategy for Base Stations Based on ...

Mar 31, 2024 · With the maturity and large-scale deployment of 5G technology, the proportion of energy consumption of base stations in the smart grid is increasing, and there is an urgent ...



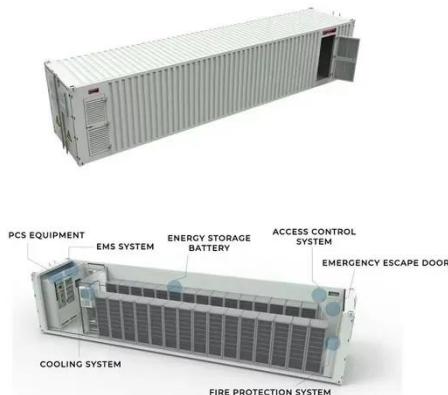
OF THE AVERAGE POWER CONSUMPTION OF A ...

Table 3 compares the average power consumed by the 5G BS with the 4G BS at different load levels. The levels of data collection on the energy consumption ...

The energy use implications of 5G:

Reviewing whole network ...

Apr 1, 2022 · Addressing this gap, we conduct a literature review to examine whole network level assessments of the operational energy use implications of 5G, the embodied energy use ...



Comparison of Power Consumption Models for 5G Cellular Network Base

Jul 1, 2024 · This paper conducts a literature survey of relevant power consumption models for 5G cellular network base stations and provides a comparison of the models. It highlights

...

Power consumption based on 5G communication

Oct 17, 2021 · At present, 5G mobile traffic base stations in energy consumption accounted for 60% ~ 80%, compared with 4G energy consumption increased three times. In the future, high



Optimal configuration for photovoltaic storage system capacity in 5G



Oct 1, 2021 · Base station operators deploy a large number of distributed photovoltaics to solve the problems of high energy consumption and high electricity costs of 5G base stations. In this ...

Power Consumption Modeling of 5G Multi-Carrier Base ...

Jan 23, 2023 · However, there is still a need to understand the power consumption behavior of state-of-the-art base station architectures, such as multi-carrier active antenna units (AAUs), ...

FLEXIBLE SETTING OF MULTIPLE WORKING MODES



An optimal siting and economically optimal connectivity ...

Feb 1, 2024 · Economically optimal simulation experiments are conducted for different PV systems. The emergence of ultra-dense 5G networks and a large number of connected ...

Specifications of different types of base stations.

According to China Tower data, on average, each outdoor 5G base station consumes about 3.8KW, equivalent to the power consumption of three 4G ...

LIQUID COOLING ENERGY STORAGE SYSTEM

EMS real-time monitoring
No container design
flexible site layout



Cycle Life
≥8000

Nominal Energy
200kwh

IP Grade
IP55



Modelling the 5G Energy Consumption using Real-world Data: Energy

Jun 26, 2024 · This paper proposes a novel 5G base stations energy consumption modelling method by learning from a real-world dataset used in the ITU 5G Base Station Energy ...

Telecom Battery Backup System , Sunwoda Energy

A telecom battery backup system is a comprehensive portfolio of energy storage batteries used as backup power for base stations to ensure a reliable and stable power supply. As we are ...



Energy Consumption of 5G, Wireless Systems ...

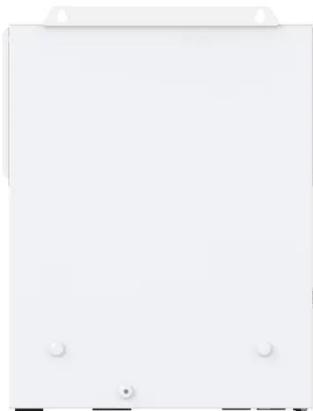
4 days ago · Reports on the Increasing Energy Consumption of Wireless Systems and Digital Ecosystem The

more we use wireless electronic devices, the more ...



Energy-efficiency schemes for base stations in 5G ...

In today's 5G era, the energy efficiency (EE) of cellular base stations is crucial for sustainable communication. Recognizing this, Mobile Network Operators are actively prioritizing EE for ...



Why does 5g base station consume so much ...

Apr 3, 2025 · The power consumption of the 5G base station mainly comes from the AU module processing and conversion and high power-consuming high ...

Research on Performance of Power Saving Technology for 5G Base ...

Jun 28, 2021 · Compared with the fourth generation (4G) technology, the fifth generation (5G) network possesses higher transmission rate, larger system

capacity and lower tran



Base station power control strategy in ultra-dense networks ...

Aug 1, 2025 · Within the context of 5G, Ultra-Dense Networks (UDNs) are regarded as an important network deployment strategy, employing a large number of low-power small cells to ...

(PDF) Dispatching strategy of base station backup power ...

Apr 1, 2023 · With the mass construction of 5G base stations, the backup batteries of base stations remain idle for most of the time. It is necessary to explore these massive 5G base ...

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flexible site layout



Breakdown of power consumption in radio base ...

Download scientific diagram , Breakdown of power consumption in radio base stations [32]. from publication: Approaches to energy efficient wireless

access ...



Modelling the 5G Energy Consumption using Real-world ...

Jun 26, 2024 · Compared to its predecessor, the fourth-generation (4G) network, the energy consumption of the 5G network is approximately three times higher [1]. Notably, energy costs ...



Energy consumption optimization of 5G base stations ...

Aug 1, 2023 · 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 [1]. It is ...

5G and Energy Efficiency

Feb 25, 2023 · automation, health, etc. The main idea behind 5G is to minimize total network energy consumption, despite increased traffic and service expansion due to its use for these ...



Carbon emissions and mitigation potentials of 5G base ...

Jul 1, 2022 · Abstract The emergence of fifth-generation (5G) telecommunication would change modern lives, however, 5G network requires a large number of base stations, which may lead ...

Front Line Data Study about 5G Power Consumption

The power consumption of a single 5G station is 2.5 to 3.5 times higher than that of a single 4G station. The main factor behind this increase in 5G power consumption is the high power ...



How Much Power Does 5G Base Station Consume?

Decoding the Power Drain The average 5G base station consumes 2.5-4 kW daily - equivalent to powering 40 refrigerators simultaneously. Three factors amplify

this:



5G Transmit Power and Antenna radiation

Jul 15, 2025 · To keep the power density per MHz similar to LTE systems, the 100MHz 3.5GHz spectrum will require 5x 80 W, which is not easy to be ...



Final draft of deliverable D.WG3-02-Smart Energy Saving ...

Oct 4, 2021 · Smart energy saving of 5G base stations: Based on AI and other emerging technologies to forecast and optimize the management of 5G wireless network energy ...

What is 5G Energy Consumption?

Aug 18, 2025 · The 5G network is a dynamic system that consumes energy continually and responds to spikes in network activity. Over 70% of this energy is consumed by RAN ...



Power Consumption Modeling of Different Base ...

Jul 18, 2010 · In this paper we developed such power models for macro and micro base stations relying on data sheets of several GSM and UMTS base stations ...

The Long Road to Sobriety: Estimating the Operational ...

May 1, 2025 · Therefore, in this paper, we estimate the operational power consumption of cellular Base Stations (BSs) deployed in France from 2015 to 2022. However, unfortunately, the lack

...



5G power consumption is 2.5 to 3 times of 4G

Apr 15, 2025 · The power consumption of a 5G single station is 2.5 to 3.5 times that of a 4G single station due to AAU

power consumption, the current full load power of a single station is nearly ...



Optimal energy-saving operation strategy of 5G base station ...

Abstract To further explore the energy-saving potential of 5 G base stations, this paper proposes an energy-saving operation model for 5 G base stations that incorporates communication ...



Carbon emissions and mitigation potentials of 5G base ...

Jul 1, 2022 · Due to the high radio frequency and limited network coverage of 5G base stations, the number of the 5G base stations are 1.4~2 times than that of the 4G base stations, and ...

Power consumption analysis of access network in 5G mobile ...

Feb 1, 2022 · The architectural differences of these networks are highlighted and power consumption analytical models that characterize the

energy consumption of radio resource ...



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Power Consumption Analysis of a 5G NR Base Transceiver ...

Jul 17, 2025 · Insights have also been provided into the power consumption requirements of outdoor base stations compared to 5G setups deployed on an in-house, indoor mobile network ...

A guide to 5G small cells and macrocells

Dec 10, 2021 · Small-cell base stations, known as transceivers, use low power and are implemented in densely populated areas and are cheaper and much ...



5G Base Stations: The Energy Consumption Challenge

Dec 11, 2020 · According to ABI Research analysis and certain infrastructure vendor statistics, the typical three 5G massive MIMO 64T64R

AAUs at a site need to consume more than 2600 ...



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