

5G base station power analysis





Overview

Can 3GPP reduce base station energy consumption in 5G NR BS?

Aiming at minimizing the base station (BS) energy consumption under low and medium load scenarios, the 3GPP recently completed a Release 18 study on energy saving techniques for 5G NR BSs . A broad range of techniques was evaluated in terms of the obtained network energy saving (NES) gain and their impact to the user-perceived throughput (UPT).

What is 5G BS power consumption?

The 5G BS power consumption mainly comes from the active antenna unit (AAU) and the base band unit (BBU), which respectively constitute BS dynamic and static power consumption. The AAU power consumption changes positively with the fluctuation of communication traffic, while the BBU power consumption remains basically unchanged , , .

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 .

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).



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[Final draft of deliverable D.WG3-02-Smart Energy Saving ...](#)

May 7, 2021 · Technical Report ITU-T Smart Energy Saving of 5G Base Station: Based on AI and other emerging technologies to forecast and optimize the management of 5G wireless network ...

[Evaluation of the power-saving effect of 5G base station ...](#)

May 29, 2025 · Abstract The research and application of energy-saving technology for 5G wireless networks are significant for the emission-reduction work of Communication Operators. ...



[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 ...



[Electric Load Profile of 5G Base Station in Distribution ...](#)

Feb 9, 2022 · This paper proposes an electric load demand model of the 5th generation (5G) base station (BS) in a distribution system based on data flow analysis. First, the electric load model ...



[Modelling the 5G Energy Consumption using Real-world ...](#)

Sep 15, 2025 · To address this, we propose a novel deep learning model for 5G base station energy consumption estimation based on a real-world dataset. Unlike existing methods, our ...



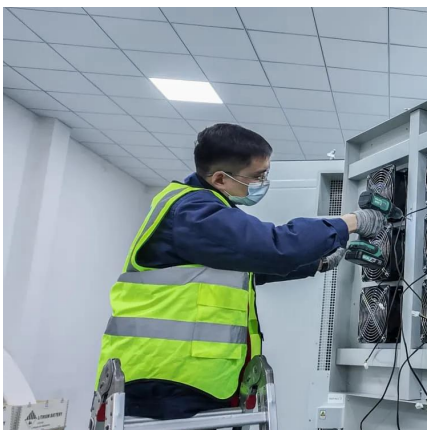
[Energy consumption optimization of 5G base stations ...](#)

Aug 1, 2023 · The 5G BS power consumption mainly comes from the active antenna unit (AAU) and the base band unit (BBU), which respectively constitute BS dynamic and static power ...



[Power Consumption Analysis of a 5G NR Base Transceiver Station ...](#)

Jul 17, 2025 · This work has explored the power consumption of an outdoor commercial 5G NR base station using an inexpensive and custom-built power measurement setup.





[A Power Consumption Model and Energy Saving Techniques for 5G ...](#)

May 28, 2023 · Aiming at minimizing the base station (BS) energy consumption under low and medium load scenarios, the 3GPP recently completed a Release 18 study on energy saving ...

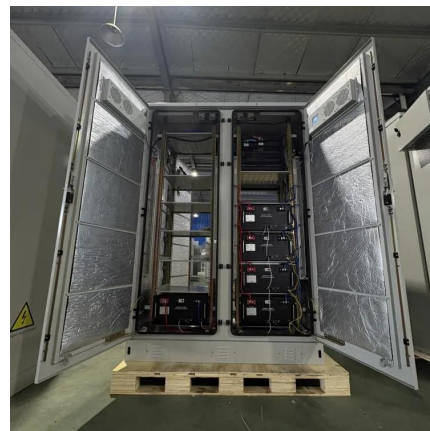


[Optimal energy-saving operation strategy of 5G base station...](#)

Dec 1, 2025 · 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 ...

[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), ...



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