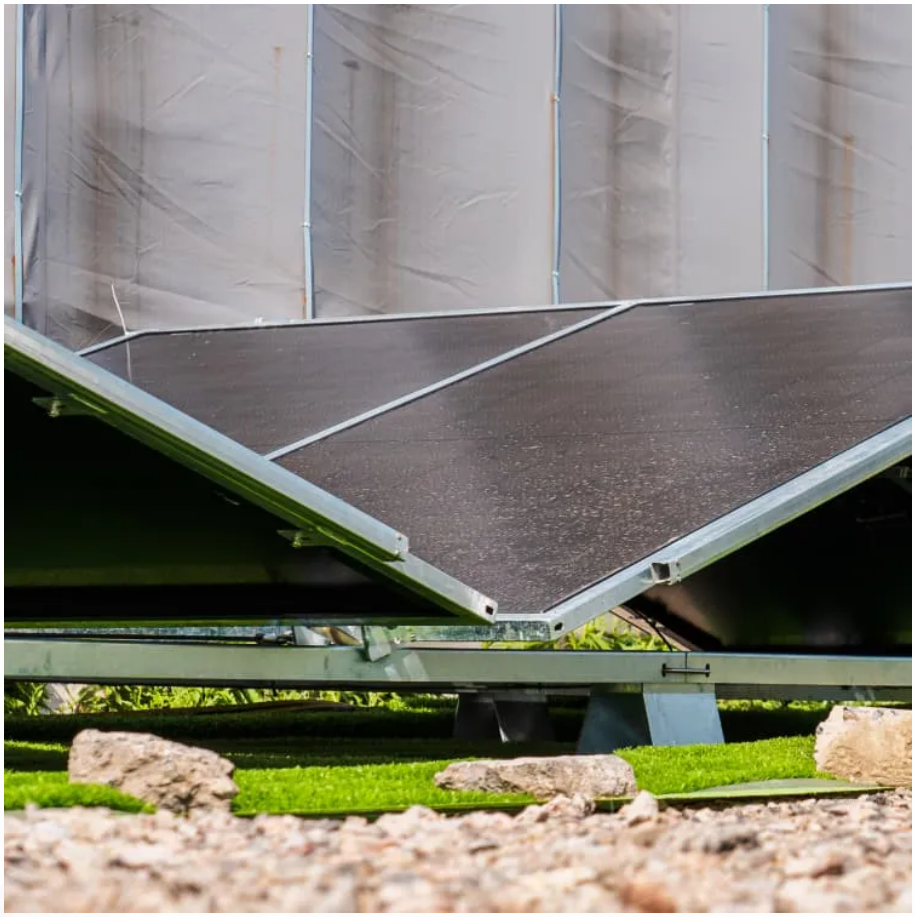
BUHLE POWER

The impact of 5G base stations on power consumption



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).

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 .

How will 5G impact MNOs?

Nevertheless, the overall energy usage by 5G base stations needs to be reduced as it will account for approximately 2%−3% of total UK's energy consumption in 2030. Energy costs account for 19% - 23% of RAN OpEx, which will seriously affect MNOs’ mainstream profits.

How can we improve the energy eficiency of 5G networks?

To improve the energy eficiency of 5G networks, it is imperative to develop sophisticated models that accurately reflect the influence of base station (BS) attributes and operational conditions on energy usage.

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

Download Citation , On May 28, 2023, Maria Oikonomakou and others published A Power Consumption Model and Energy Saving Techniques for 5G-Advanced Base Stations , Find, ...

[Modelling the 5G Energy Consumption Using Real-world ...]

Sep 15, 2025 · Accurate energy consumption modeling is essential for developing energy-efficient strategies, enabling operators to optimize resource uti-lization while maintaining network ...

[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 · Under full-load conditions, the power consumption of 5 G base stations is approximately 3-4 times that of 4 G base stations, which has a notable impact on energy ...

[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 ...

[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 ...

[Energy Consumption Modelling for 5G Radio Base ...]

Mathematical optimization of energy consumption requires a model of the prob-lem at hand. In this thesis linear regression is compared with the gradient boosted trees method and a neural ...

[IMPACT OF 5G Technology on power consumption and ...]

Jun 14, 2024 · Moreover, the densification of 5G networks, characterized by the deployment of a higher density of small cells and base stations, further exacerbates power consumption ...

[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), ...

[5G network deployment and the associated energy consumption ...]

Jul 1, 2022 · To investigate the future development and potential energy impact of 5G, this study focuses on modelling the development of 5G base stations in the UK in the next ten years by ...

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