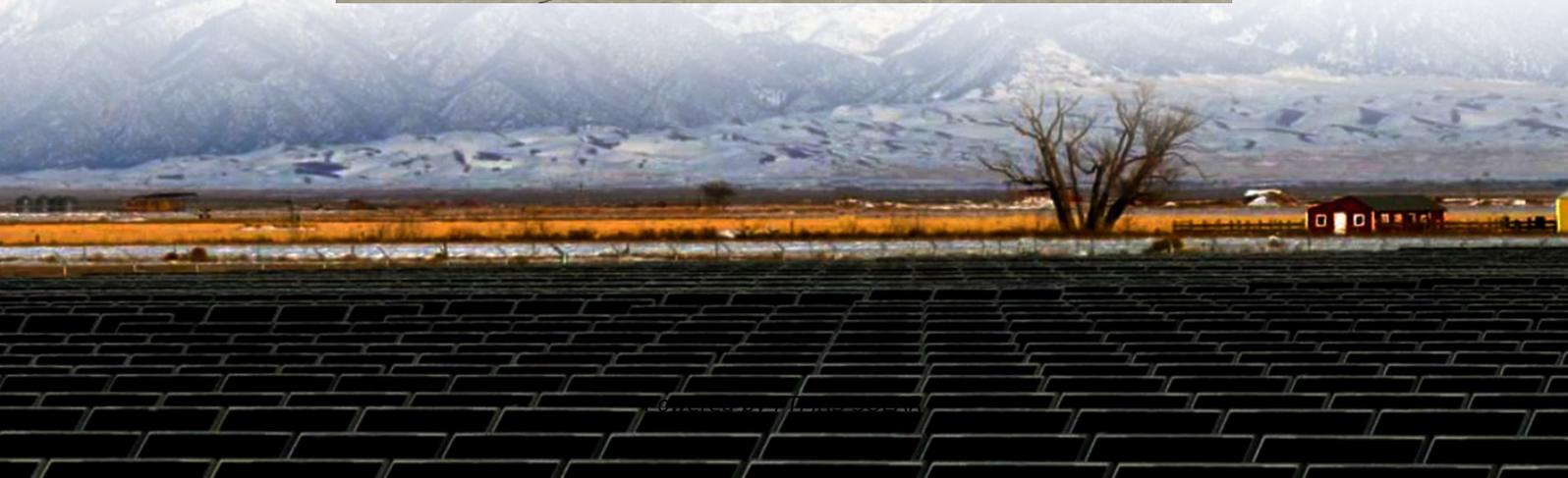


# **5G base station power consumption measurement and monitoring**





## Overview

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Why do we need a 5G base station?

The limited penetration capability of millimeter waves necessitates the deployment of significantly more 5G base stations (the next generation Node B, gNB) than their 4G counterparts to ensure network coverage . Notably, the power consumption of a gNB is very high, up to 3–4 times of the power consumption of a 4G base stations (BSs).

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 a balanced dataset improve energy prediction of 5G base stations?

For energy prediction of 5G base stations, this thesis finds that using a more balanced dataset, in terms of the number of samples for each product, has a positive impact for the ANN and the Gradient Boosted Trees model while the linear regression performs worse.

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).



## 5G base station power consumption measurement and monitoring

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### 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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### 5G Base Station Power Consumption Using Machine Learning

Apr 25, 2025 · Accurate power consumption forecasting plays a pivotal role in energy management, influencing both utility operations and customer experience. With increasing ...

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### A measurement-based approach to analyze the power consumption ...

May 1, 2024 · In this paper, we propose and validate a measurement-based approach to analyze the power consumption of a virtualized 5G core network (5GC) deployment.

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### Energy Consumption Modelling for 5G Radio Base ...

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

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### Modeling and aggregated control of large-scale 5G base stations ...

Mar 1, 2024 · Notably, the power consumption of a gNB is very high, up to 3-4 times of the power consumption of a 4G base stations (BSs). The substantial quantity, rapid growth rate, and high ...

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### 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 ...

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### 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 utilization while maintaining network ...

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### 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 ...

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### Energy Consumption Supervision Research on an AI ...

3. Capability framework of the AI-based 5G base station energy supervision cloud platform The construction of an AI-based 5G base station energy supervision platform is a highly complex ...

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### 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.

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