

# **Power consumption of 4G and 5G base stations**





## 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).

Can machine learning predict energy consumption for 5g/4g radio base stations?

To further develop energy modelling methodology and attempt to answer the questions presented in the previous section, different machine learning algorithm's ability to predict energy consumption is investigated for 5G/4G radio base stations.

How much energy does a 4G ran consume?

In 2020, we estimate that 4G RANs consume 112 GWh, which corresponds to 0.13% of the annual electricity consumption in Belgium (i.e., 84.7 TWh ). In 2025, the total energy consumption goes up, especially with extensive 5G deployments, as shown in Fig. 7a.

Does 4G consume more energy than 5g?

If 4G is additionally decommissioned, the total RAN energy consumption can drop, but this scenario is very unlikely by 2025. Therefore, we show that concurrently operating country-wide 4G and 5G RANs consumes more energy than using only one generation.



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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 ...

### 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 ...



### 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 ...



[Evaluation and projection of 4G and 5G RAN energy ...](#)

Nov 29, 2022 · Energy consumption of mobile cellular communications is mainly due to base stations (BSs) that constitute radio access networks (RANs). 5G technologies are expected to ...



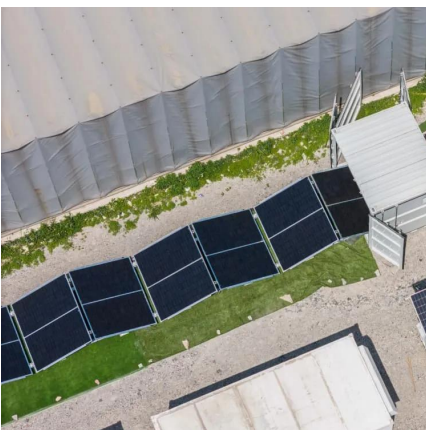
[Power Consumption Modeling of 5G Multi-Carrier Base ...](#)

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), ...



[A technical look at 5G energy consumption and performance](#)

Base Station Power Consumption  
Energy Saving Features of 5G New Radio  
How Much Energy Can We Save with Nr Sleep Modes?  
Impact on Energy Efficiency and Performance in A Super Dense Urban Scenario  
Further Reading  
Today we see that a major part of energy consumption in mobile networks comes from the radio base station sites and that the consumption is stable. We can also see that even in densely deployed networks, as in city centers, the network traffic





load can fluctuate very much during the day, with significant periods of almost no traffic in the base sta See more on ericsson Missing: base stationsMust include: base stationsSpringer

## Evaluation and projection of 4G and 5G RAN energy ...

Nov 29, 2022 · Energy consumption of mobile cellular communications is mainly due to base stations (BSs) that constitute radio access networks (RANs). 5G technologies are expected to ...

### Comparison of Power Consumption Models for 5G Cellular Network Base

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