

Calculation formula for power consumption of communication base stations





Overview

A linear equation is developed is $Y = 1.713 \times X + 1.274$, where Y is power consumption and X is traffic generated, which shows that the power consumption of base stations linearly depends on the traffic generated. Is there a direct relationship between base station traffic load and power consumption?

The real data in terms of the power consumption and traffic load have been obtained from continuous measurements performed on a fully operated base station site. Measurements show the existence of a direct relationship between base station traffic load and power consumption.

How can a power consumption model be used to estimate power consumption?

Quantification models are most suitable for quantifying overall power consumption of base station or even networks as part of large-scale evaluations. The number and complexity of parameters is limited, and simple usage with load profiles or traffic models is possible to estimate total energy consumption.

How do you calculate energy consumption of wireless communication systems?

The first step when modeling the energy consumption of wireless communication systems is to derive models of the power consumption for the main system components, which are then combined with time-dependent traffic load models to estimate the consumed energy.

What is a LTE power consumption model?

The model by Auer et al. described in [1], was developed as part of the EARTH (Energy Aware Radio and neTwork tecHnologies) project. It is based on measurements of LTE hardware. Most notably, the model proposes a linear increase of power consumption with the output power (or load) of the base station.



Can a base station Power model be combined?

As the main components are common to most of the models, they can be easily combined to form a new model. Most of the base station power models are based on measurements of LTE (4G) hardware or theoretical assumptions. For the more recent models, based on measurements of 5G hardware, the parameter values are not publicly available.

Do base stations dominate the energy consumption of the radio access network?

Furthermore, the base stations dominate the energy consumption of the radio access network. Therefore, it is reasonable to focus on the power consumption of the base stations first, while other aspects such as virtualization of compute in the 5G core or the energy consumption of user equipment should be considered at a later stage.



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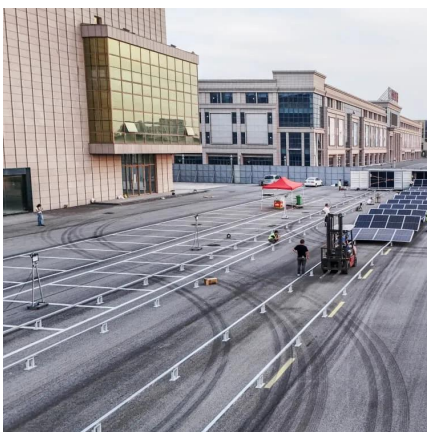
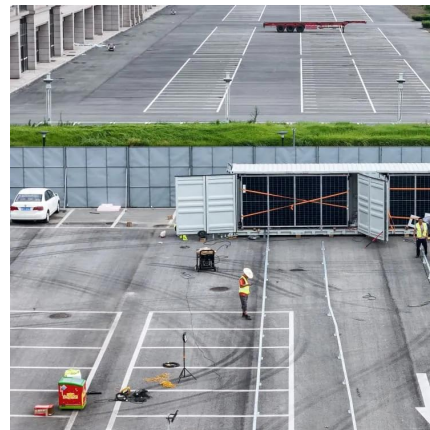


[A Power Efficiency Metric for Comparing Energy ...](#)

Abstract--Future wireless cellular networks will utilize millimeter-wave and sub-THz frequencies and deploy small-cell base stations to achieve data rates on the order of hundreds of gigabits ...

[Multi-objective interval planning for 5G base station virtual ...](#)

With the rapid rise of 5G digitisation and its applications, as the core infrastructure connecting communication users and radio access networks, the construction scale of 5G base stations ...



[Power Consumption Modeling of Base Station as per Traffic ...](#)

This paper investigates changes in the power consumption of base stations according to their respective traffic and develops a model for the power consumption as per traffic generated ...

[Energy-Efficient Base Stations , part of Green Communications](#)

The impact of the Base Stations comes from the combination of the power consumption of the equipment itself (up to 1500 Watts for a



nowadays macro base station) multiplied by the ...



Measurements and Modelling of Base Station Power Consumption under Real

Measurements show the existence of a direct relationship between base station traffic load and power consumption. According to this relationship, we develop a linear power consumption ...

Comparison of Power Consumption Models for 5G Cellular Network Base

Power consumption models for base stations are briefly discussed as part of the development of a model for life cycle assessment. An overview of relevant base station power ...



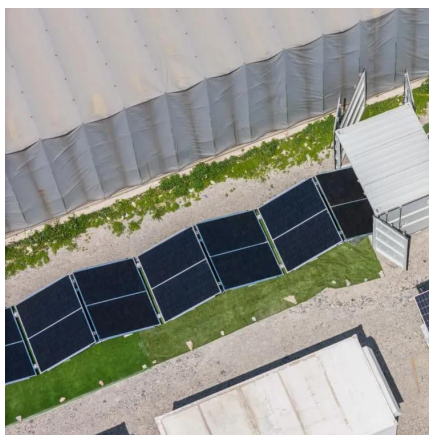
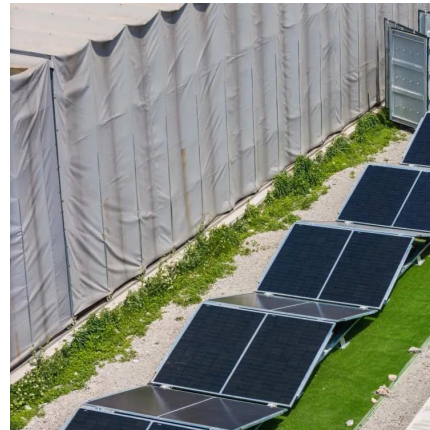
Machine Learning and Analytical Power Consumption Models for 5G Base

In this article, we propose a novel model for a realistic characterization of the power consumption of 5G multi-carrier BSs, which builds on a large data collection campaign.



[Power consumption models of base station : measurements and...](#)

These insights highlight the need for ongoing research into better methods for accurately measuring and optimizing power consumption in base stations. This research is crucial for ...

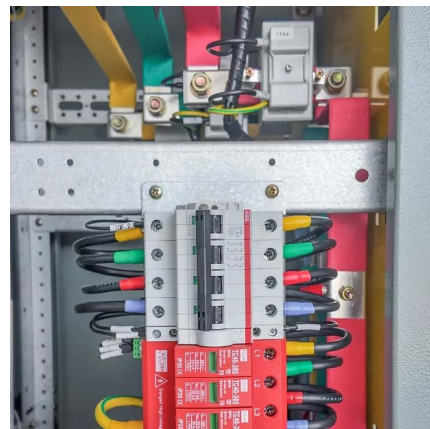


[An Analytical Energy Performance Evaluation Methodology for 5G Base](#)

The implementation of various base station (BS) energy saving (ES) features and the widely varying network traffic demand makes it imperative to quantitatively evaluate the energy ...

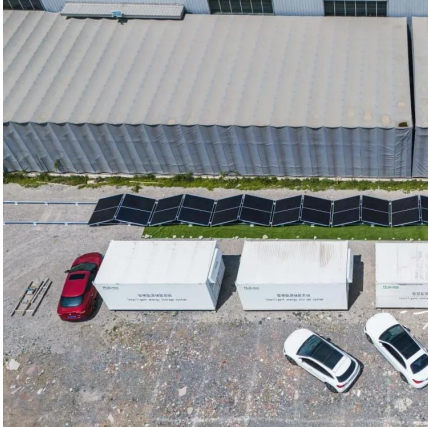
[Multi-objective interval planning for 5G base station virtual power](#)

Large-scale deployment of 5G base stations has brought severe challenges to the economic operation of the distribution network, furthermore, as a new type of adjustable load, ...



[Optimal Base Station Density for Power Efficiency in ...](#)

Power efficiency is defined as inverse of the area power consumption. We call the network to be power efficient if the area power consumption decreases with increase of base station density.



Collaborative optimization of distribution network and 5G base stations

In this paper, a distributed collaborative optimization approach is proposed for power distribution and communication networks with 5G base stations. Firstly, the model of 5G ...



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