

# Intelligent Energy Solution for Railway Communication Base Stations





## Overview

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This paper proposes an intelligent reflecting surface (IRS)-assisted energy efficiency optimization algorithm to address the problem of energy efficiency (EE) degradation in high-speed rail communication systems caused by line-of-sight link blockages between base stations and trains. The effective operation of railway stations and improved passenger flow have a significant impact on the availability of mobility services, passenger throughput and passenger experience. In order to unlock the challenge and increase rail capability, the railway industry and governments worldwide are preparing 5G communication infrastructure for the next generation and beyond, aiming to provide ultra-high performance connection with millisecond latency, gigabit per second. This technical report explores how network energy saving technologies that have emerged since the 4G era, such as carrier shutdown, channel shutdown, symbol shutdown etc.



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### **An Overview of Current Challenges and Emerging**

Current trends in railway energy saving research have focused on driving strategy, propulsion, and energy storage systems , whereas reference

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### **Optimization of Energy Management and Capacity Sizing for Railway**

Abstract: Global warming has become an increasingly important issue, prompting the need for more sustainable solutions in energy-intensive sectors such as railways. Utilizing renewable energy and

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## **Performance of Base Stations in Railway Digital Radio Communication**

Abstract Base station (BS) is a terminal device of a radio communication network, while railway radio communications play an important role in ensuring safety of passenger and cargo

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## **An Energy-Efficient Optimization Method for High-Speed Rail**

This paper proposes an intelligent reflecting surface (IRS)-assisted energy efficiency optimization algorithm to address the problem of energy efficiency (EE) degradation in high-speed

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## **(PDF) Innovative Communication System for Railways**

In this work it is proposed the usage of the most recent IEEE 802.11 Wi-Fi technologies



to exchange the Compiled Energy Billing Data (CEBD)

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## **Discovering a Sustainable Power Solution for Next Generation 5G**

The engineering research idea proposed here is to discover a sustainable, self-powered solution by harvesting high electromagnetic field flux energy generated by currents of electrified railway systems

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## **Advanced 6 G wireless communication technologies for intelligent high**

Therefore, this article gives a review of the current advanced 6 G wireless communication technologies for HSR, including random access and switching, channel estimation and beamforming,

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## **Digital station solutions and railway communication**

Our digital station portfolio aligns with these key performance indicators and combines all of our products and services for railway stations. Improve

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## **Energy-saving Solutions for Base Stations in High-Speed Railway**

This paper analyzes the problem of insufficient energy-saving means during network idle periods in the current 5G base station deployments for high-speed railway dedicated networks,

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## **Energy-saving Solutions for Base Stations in High**



This paper analyzes the problem of insufficient energy-saving means during network idle periods in the current 5G base station deployments for high

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## **Intelligent Energy Saving Solution of 5G Base Station Based on**

This paper introduces the basic energy-saving technology of 5G base station, and puts forward the intelligent energy-saving solutions based on artificial intelligence (AI) and big data technologies to

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## **Energy-efficiency schemes for base stations in 5G heterogeneous**

In today's 5G era, the energy efficiency (EE) of cellular base stations is crucial for sustainable communication. Recognizing this, Mobile Network Operators are actively prioritizing EE for both

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## **Supporting the Design of Intelligent Railway Stations**

SmartStation. Railway stations are a primary point of aggregation in every urban centre, but traditionally they are isolated from the urban context.

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## **Resource management in cellular base stations powered by**

This paper aims to consolidate the work carried out in making base station (BS) green and energy efficient by integrating renewable energy sources (RES). Clean and green technologies

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## **An Energy-Efficient Optimization Method for High-Speed**



This paper proposes an intelligent reflecting surface (IRS)-assisted energy efficiency optimization algorithm to address the problem of energy

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## **Application of AI technology 5G base station**

The intelligent energy-saving of base station using AI technology should be divided into different types of problems, study the characteristics of telecommunication analysis and modeling.

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## **Sustainable and smart rail transit based on advanced self-powered**

As rail transit continues to develop, expanding railway networks increase the demand for sustainable energy supply and intelligent infrastructure management. In recent years, advanced rail

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## **Energy Storage for Communication Base**

The one-stop energy storage system for communication base stations is specially designed for base station energy storage. Users can use the energy storage

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## **Energy-Efficient AI Models for 6G Base Station**

An intelligent base station is designed to use artificial intelligence (A.I.) and machine learning techniques to optimize its performance and improve overall energy efficiency. It is unclear what specific features

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## **Sustainable Electric Railway System Integrated With**

Global concern about the energy crisis and its environmental impact has focused on



sustainable alternatives. The electric railway system (ERS) is a

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## **Communication Base Station Energy Storage Systems**

Powering Connectivity in the 5G Era: A Silent Energy Crisis? As global 5G deployments surge to 1.3 million sites in 2023, have we underestimated the energy storage demands of modern

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## **5G and energy internet planning for power and communication**

Our research addresses the critical intersection of communication and power systems in the era of advanced information technologies. We highlight the strategic importance of

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## **Optimal energy-saving operation strategy of 5G base station with**

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 communication caching and

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## **Sustainable Electric Railway System Integrated With**

This study introduces railway energy management systems (REMSs) as a green solution to address these challenges. REMS not only mitigates

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## **The Importance of Renewable Energy for**

Installations of telecommunications base stations necessary to address the surging



demand for new services are traditionally powered by

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## **Smart railways with mission-critical 4G and 5G**

Rail companies can provide infotainment services, real-time travel information, and improved communication during journeys. Modernizing passenger services will keep railway operators on track

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## **Intelligent Energy-Efficiency Trajectory Planning of Heterogeneous Air**

With the development of 6G, emergency communication services upgrade and the need for edge intelligence is increasing. However, today's 6G emergency communication scenarios are changeable

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## **Final draft of deliverable D.WG3-02-Smart Energy Saving of 5G Base**

The AI-driven network energy saving solution can forecast the traffic load of base stations based on historical traffic load, service type, site coverage and user behaviors.

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