

Low-loss agent for communication power systems



Article Overview

Low-loss communication in power systems can be achieved using specialized propagation modes like the Sommerfeld-Goubau (SG) mode and optimized multi-agent communication protocols for reliable data exchange.

Physical-Layer Low-Loss Communication

Sommerfeld-Goubau (SG) mode is a surface wave propagation mode on a single lossy conductor, which allows long-distance, low-loss communication over power lines. Originally studied by Sommerfeld and later extended by Goubau, this mode can be enhanced using dielectric-coated conductors or parallel conductors, improving signal integrity for distances on the order of 100 meters or more. Microwave power line communication systems leveraging SG modes benefit from reduced attenuation compared to conventional free-space or standard PLC methods, making them suitable for high-reliability applications in smart grids and microgrids .

Power Line Communication (PLC) Considerations

PLC systems face challenges such as background noise, variable line impedance, and signal attenuation. Low-loss communication can be achieved by characterizing the line properties and adaptively tuning the system to the local environment. Field experiments in microgrids and multi-story buildings have shown that tailored PLC systems can maintain reliable communication where conventional PLC fails, particularly for demand response and control applications

Article Content

Effects of Communication Signal Delay on the Power Grid: A Review

Communication plays a huge role in the operation of modern power systems. It permits a real-time monitoring

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In this paper, we have presented a communication-oriented design of a full-fledged system for the minimization of power losses in

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Multiagent Distributed Secondary Control for Energy Storage Systems ...

Abstract: For the energy storage system (ESS) with lossy communication networks of packet loss in DC microgrid, the multiagent

Characterizing Low-Data-Rate Power Line Communication Channels

PLC system may also be adaptively tuned to measurements of the current local environment. Field experiments in a

Resilient load frequency control of multi-area power systems with ...

Abstract The growing dependence on communication networks in modern load frequency control (LFC) systems makes

Transmission Loss Minimization Strategies

Explore actionable strategies for minimizing transmission loss in electric power systems for optimal performance.

Distributed Optimal Frequency Control under communication packet loss ...

Abstract This paper investigates the impact of communication packet loss on Distributed Optimal Frequency Control

GridMind: LLMs-Powered Agents for Power System Analysis and

This paper presents GridMind, a multi-agent AI system that integrates Large Language Models (LLMs) with

Bio inspired multi agent system for distributed power and ...

To address these limitations, this work proposes a novel bio-inspired Termite Colony Optimization-based Multi-Agent

3.9: Lossless and Low-Loss Transmission Lines

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Grid Communication Technologies

This paper describes the various communication technologies available and their limitations and advantages for different grid

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Adaptive energy loss optimization in distributed networks using ...

Background Energy distribution network (EDN) management is a key task in current power systems due to the ever

Multi-agent Systems in Power System: A Comprehensive Review

This comprehensive review delves into the extensive application of multi-agent systems (MAS) in power systems. It

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Accurate measurement-based convex model to estimate transmission loss ...

This work proposes a convex methodology that uses power system measurements (power generation and total

Security-constrained line loss minimization in distribution systems ...

Focused on the challenges raised by the large-scale integration of renewable energy resources and the urgent goal of

Power Efficient Communication for Low Signal to Noise Ratio Optical

While the transmitted power and link loss are primarily limited by engineering capabilities, the receiver sensitivity is fundamentally

Grid-Agent: An LLM-Powered Multi-Agent System for Power Grid Control

This paper introduces Grid-Agent, an autonomous AI-driven framework that leverages Large Language Models (LLMs)

Large Language Model-based power dispatch agent ...

Recently, the large language model (LLM) Agent has been proposed, incorporating the LLM with human-like

A cyber-resilient multi-agent protection scheme for power distribution ...

This paper proposes a fully distributed, cyber-resilient multi-agent protection scheme for power distribution systems

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Large Language Model-based power dispatch agent ...

To explore the potential of LLM-based agents in power dispatch, we investigate the relevant research of LLM-based

Loss minimization techniques for optimal operation and

Summary In an electrical power system, the generated power is transferred through a high voltage

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Power Systems: Transmission Loss Analysis

Explore strategies for transmission line loss analysis in electric power systems with actionable insights for power systems analysts.

Power Line Communication with Network Transmission Data Loss

This paper proposed power line communication with transmission data. An iterative learning control method for the

Cooperative Control of Multi-Agent Systems Under Communication

This paper addresses the challenging problem of achieving consensus in multi-agent systems (MASs) under the

Low Entropy Communication in Multi-Agent Reinforcement Learning

Communication in multi-agent reinforcement learning has been drawing attention recently for its significant role in

Perplexity

Perplexity is a free AI-powered answer engine that provides accurate, trusted, and real-time answers to any question.

Power System Loss Reduction Strategy Considering Security ...

Coordinating various controllable distributed resources to reduce network losses is crucial to the secure and

CURRENT COMMUNICATION MEDIA IN POWER SYSTEM

Abstract—Communication has always played a critical role in power systems and will become even more critical when it comes to

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