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(57) Abstract :

ABSTRACT The exponential growth in wireless communications necessitates advanced management and optimization techniques to handle the increasing complexity and demands of modern networks. This research proposes an AI-driven autonomous network management and optimization framework for wireless networks, aimed at enhancing performance, reliability, and user experience. The system leverages cutting-edge Artificial Intelligence (AI) techniques, including machine learning and deep learning, to automate network configuration, dynamic resource allocation, fault detection, and recovery processes. By employing real-time data processing and adaptive algorithms, the framework ensures optimal utilization of network resources, reduces latency, and maximizes throughput. Key components include AI models for predictive maintenance, user behavior analysis, and security threat mitigation, which collectively contribute to a resilient and secure network infrastructure. The proposed solution is designed to be scalable, interoperable with existing and future network technologies, and compliant with regulatory standards. Extensive testing in both simulated and real-world environments demonstrates the system's capability to autonomously manage network operations, providing significant improvements in energy efficiency, fault recovery times, and overall Quality of Service (QoS). This AI-driven approach represents a transformative advancement in the field of wireless communications, offering a robust solution to meet the evolving challenges and demands of next-generation networks.

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