

Title: Dynamic Spectrum Allocation and Pricing in CR-NAN for Smart Grid Using Machine Learning Techniques

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Abstract: In the evolving landscape of smart grids, ensuring efficient and reliable communication through cognitive radio-based neighborhood area networks (CR-NAN) is paramount. This paper introduces an innovative machine learning-based framework for dynamic spectrum allocation and differential pricing in CR-NAN, tailored to enhance smart grid operations. Recognizing the critical challenges of spectrum scarcity, dynamic demand, and the need for efficient resource management, we propose a comprehensive solution leveraging Convolutional Neural Networks (CNN), and Recurrent Neural Networks (RNN). These techniques are employed to predict spectrum availability, dynamically allocate spectrum resources, and implement a dynamic pricing model that adjusts to real-time network conditions and demand. Our methodology emphasizes not only the maximization of spectrum utilization but also the optimization of network performance through intelligent pricing strategies and admission control mechanisms. Through extensive simulations, our results demonstrate significant improvements in spectrum efficiency, network throughput, and overall communication reliability for smart grid applications. We evaluate results using spectrum utilization (percentage), network throughput (Bits per second (bps)), and pricing efficiency (percentage).

Keywords: Recurrent neural networks , Pricing , Machine learning , Predictive models , Dynamic scheduling , Throughput , Smart grids

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