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Section Information

The "Electrical, Electronics and Communications Engineering" section is open to receive high-quality papers on either experimental or theoretical aspects reporting state-of-the-art technology and recent advancements in the field of electrical engineering (electric machines and drives, monitoring, control, power quality, microgrids, renewable energies harvesting), electronics engineering (antennas and radio propagation, electromagnetic compatibility, microwaves, radars and sonar navigation), and communication engineering (connected vehicles, IoT, networking technologies, wireless networks). The section also welcomes rudimentary and challenging studies.

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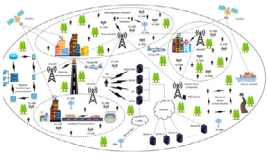
Featured Papers

DOI:10.3390/app12010426

An Overview of Reinforcement Learning Algorithms for Handover Management in 5G Ultra-Dense Small Cell Networks

Authors: Jawad Tanveer, Amir Haider, Rashid Ali and Ajung Kim

Abstract: The fifth generation (5G) wireless technology emerged with marvelous effort to state, design, deployment and standardize the upcoming wireless network generation. Artificial intelligence (AI) and machine learning (ML) techniques are well capable to support 5G latest technologies that are expected to deliver high data rate to upcoming use cases and services such as massive machine type communications (mMTC), enhanced mobile broadband (eMBB), and ultra-reliable low latency communications (uRLLC). These services will surely help Gbps of data within the latency of few milliseconds in Internet of Things paradigm. This survey presented 5G mobility management in ultra-dense small cells networks using reinforcement learning techniques. First, we discussed existing surveys then we are focused on handover (HO) management in ultra-dense small cells (UDSC) scenario. Following, this study also discussed how machine learning algorithms can help in different HO scenarios. Nevertheless, future directions and challenges for 5G UDSC networks were concisely addressed.

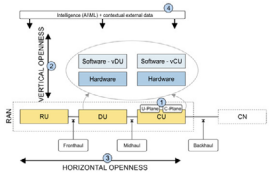


DOI:10.3390/app12010408

Open RAN—Radio Access Network Evolution, Benefits and Market Trends

Authors: Dariusz Wypiór, Mirosław Klinkowski and Igor Michalski

Abstract: Open RAN (radio access network) movement is perceived as a game changer, having robust potential to introduce shifts in mobile radio access networks towards tailor-made solutions based on the architecture decomposition. It is widely assumed that those changes will affect the approach to network deployments and supply chains of network elements and their further integration and maintenance. First deployments of O-RAN-based networks have already delivered broadband services to end users. In parallel, many proof-of-concept feature evaluations and theoretical studies are being conducted by academia and the industry. In this review, the authors describe the RAN evolution towards open models and make an attempt to indicate potential open RAN benefits and market trends.

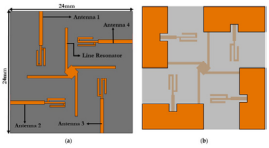


DOI:10.3390/app12094280

mmWave Four-Element MIMO Antenna for Future 5G Systems

Authors: Muhammad Abbas Khan, Abdullah G. Al Harbi, Saad Hassan Kiani, Anis Nurashikin Bt. Nordin, Mehr E Munir, Sohail Imran Saeed, Javed Iqbal, Esraa Mousa Ali, Mohammad Alibakhshikenari and Mariana Dalarsson

Abstract: This paper presents an S-shape four-port Multiple Input Multiple Output (MIMO) wideband mmWave antenna with bandwidth of 25 GHz to 39 GHz. The antenna is designed on 0.254 mm ultra-thin RO5880 with permittivity of 2.3. The dimensions of proposed S-shape antenna are 10 × 12 mm for single element and 24 × 24 mm for four-port MIMO configuration. A decoupling network is introduced to further compress mutual coupling among MIMO elements. The peak gain achieved is 7.1 dBi and MIMO assembly delivers diversity scheme. The proposed MIMO antenna is fabricated, and simulated results are found to be in excellent agreement with simulations. Through the results obtained, the proposed MIMO antenna system can be considered as a potential candidate for future mmWave devices.

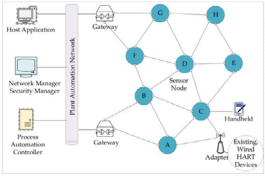


DOI:10.3390/app12020544

Reliable Fault Tolerant-Based Multipath Routing Model for Industrial Wireless Control Systems

Authors: H Abdulrab, FA Hussin, A Abd Aziz, A Awang, I Ismail and PAM Devan

Abstract: Communication in industrial wireless networks necessitates reliability and precision. Besides, the existence of interference or traffic in the network must not affect the estimated network properties. Therefore, data packets have to be sent within a certain time frame and over a reliable connection. However, the working scenarios and the characteristics of the network itself make it vulnerable to node or link faults, which impact the transmission reliability and overall performance. This article aims to introduce a developed multipath routing model, which leads to cost-effective planning, low latency and high reliability of industrial wireless mesh networks, such as the WirelessHART networks. The multipath routing model has three primary paths, and each path has a backup node. The backup node stores the data transmitted by the parent node to grant communication continuity when primary nodes fail. The multipath routing model is developed based on optimal network planning and deployment algorithm. Simulations were conducted on a WirelessHART simulator using Network Simulator (NS2). The performance of the developed model is compared with the state-of-the-art. The obtained results reveal a significant reduction in the average network latency, low power consumption, better improvement in expected network lifetime, and enhanced packet delivery ratio which improve network reliability.



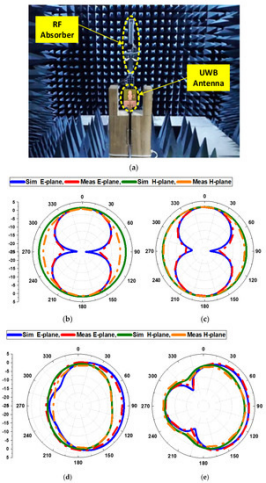
Featured Papers

DOI:10.3390/app12020821

A Jug-Shaped CPW-Fed Ultra-Wideband Printed Monopole Antenna for Wireless Communications Networks

Authors: Sarosh Ahmad, Umer Ijaz, Salman Naseer, Adnan Ghaffar, Muhammad Awais Qasim, Faisal Abrar, Naser Ojaroudi Parchin, Chan Hwang See and Raed Abd-Alhameed

Abstract: A type of telecommunication technology called an ultra-wideband (UWB) is used to provide a typical solution for short-range wireless communication due to large bandwidth and low power consumption in transmission and reception. Printed monopole antennas are considered as a preferred platform for implementing this technology because of its alluring characteristics such as light weight, low cost, ease of fabrication, integration capability with other systems, etc. Therefore, a compact-sized ultra-wideband (UWB) printed monopole antenna with improved gain and efficiency is presented in this article. Computer simulation technology microwave studio (CSTMWS) software is used to build and analyze the proposed antenna design technique. This broadband printed monopole antenna contains a jug-shaped radiator fed by a coplanar waveguide (CPW) technique. The designed UWB antenna is fabricated on a low-cost FR-4 substrate with relative permittivity of 4.3, loss tangent of 0.025, and a standard height of 1.6 mm, sized at 25 mm × 22 mm × 1.6 mm, suitable for wireless communication system. The designed UWB antenna works with maximum gain (peak gain of 4.1 dB) across the whole UWB spectrum of 3–11 GHz. The results are simulated, measured, and debated in detail. Different parametric studies based on numerical simulations are involved to arrive at the optimal design through monitoring the effects of adding cuts on the performance of the proposed antennas. Therefore, these parametric studies are optimized to achieve maximum antenna bandwidth with relatively best gain. The proposed patch antenna shape is like a jug with a handle that offers greater bandwidth, good gain, higher efficiency, and compact size.



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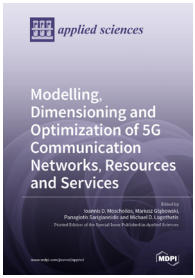

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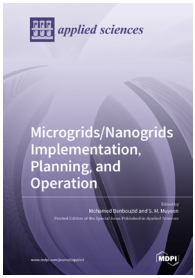

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