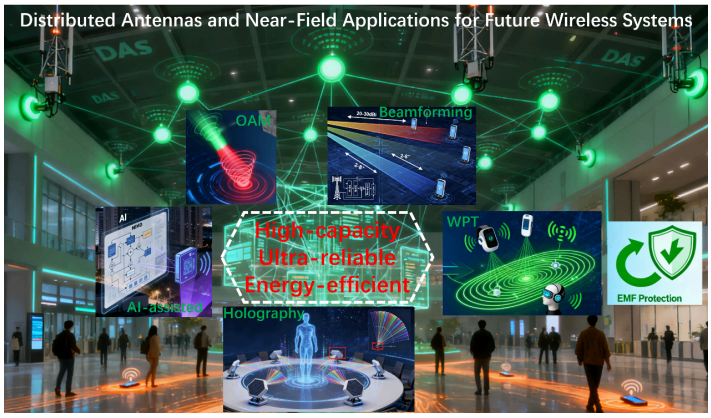
IEEE AP-S Antennas and Propagation Society
IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION

IEEE TAP Special Issue

Distributed Antennas and Near-Field Applications for Future Wireless Systems



The rapid evolution of wireless communication technologies, including 6G, satellite networks, and IoT, has heightened the demand for innovative antenna architectures and application transformations. Distributed antenna systems (DAS) and near-field communication techniques are emerging as critical enablers for high-capacity, ultra-reliable, and energy-efficient wireless networks. Distributed antennas enable flexible and scalable wireless coverage with antenna arrays (MIMO antenna arrays) distributed spatially, mitigating path loss and interference issues while enhancing spectral efficiency. Similarly, near-field communication techniques are gaining traction in scenarios requiring precise spatial control, such as ultra-massive MIMO, near-field wireless power transfer, and enhanced security applications. The aspects of energy efficiency and electromagnetic field (EMF) exposure should also be considered in the implementations of DAS and near-field applications to mitigate or reduce the effects of electromagnetic fields on humans and devices, promoting radio-friendly environments.

This special issue aims to gather recent advances in DAS, near-field communications, and their applications in next-generation wireless networks. We welcome original research articles covering theoretical advancements, practical implementations, and experimental validations in these areas. The focus will be on novel methodologies, innovative architecture, performance improvements, and real-world deployment challenges. By consolidating innovative research in these fields, this special issue aims to bridge the gap between theoretical models and practical realizations, fostering interdisciplinary collaboration and knowledge exchange.

Topics of interest: We invite high-quality contributions on topics including, but not limited to:

- Distributed Antenna System (DAS) architectures for 5G and beyond
- Synthesis and optimization tools for near-field distributed antenna systems
- Efficient DAS connection methods between antennas and central processing units (CPUs), such as radio on fiber, over optical fiber, mm-wave and THz, etc.
- Advanced antennas with enhanced coverage
- Near-field communication and its applications in emerging technologies
- Reconfigurable intelligent surfaces (RIS) and metasurface-enhanced distributed antennas
- Beamforming and spatial multiplexing techniques in DAS and near-field regimes
- Massive MIMO and cell-free architectures utilizing distributed antennas
- Near-field integrated communication and sensing
- Advanced spatial modulation techniques such as orbit angular momentum in near-field scenarios
- Interference management in distributed and near-field systems
- Artificial intelligence-enabled optimization for DAS and near-field applications
- Distributed antenna system MIMO channels, OTA test of massive XMMIMO (Extreme Multiple-Input Multiple Output)
- Distributed antenna system-based sensing and localization

- Distributed antenna system for wireless power transfer
- Distributed antenna system-related standardizations
- Innovative and emerging application scenarios and use cases enabled by distributed antennas or near-field communications, such as imaging, sensing
- Experimental studies, real-world deployments, and applications of DAS, such as DAS for satellite communications, DAS for swarm mobile systems and UAVs, DAS for communications in complex environments, etc.
- Energy-aware architectures for DAS, low-power implementations of DAS, and EMF-aware deployment strategies for the DAS and near-field applications
- EMF (electromagnetic field) exposure analyses for DAS-based application

Data and Code Sharing

All authors are invited to share via IEEE Data Port and IEEE Code Ocean the used data and developed codes to enhance the reproducibility and visibility of the articles published in the Special Issue.

Keywords

1. Distributed antenna system
2. Advanced antennas for distributed antenna systems
3. Metasurfaces and electromagnetic surfaces
4. Near-field applications
5. Enhanced coverage
6. Spatial multiplexing technique
7. Integrated communication and sensing
8. Sensing and localization
9. Massive MIMO and cell-free architecture
10. EMF exposure analyses

Guest Editors

Peng Mei: Huazhong University of Science and Technology, China, pengmei@ieee.org

Shuai Zhang (FIEEE): Aalborg University, Denmark, sz@es.aau.dk

Zhinong Ying (FIEEE): Yangtze Delta Institute (Huzhou), University of Electronic Science and Technology of China, China, Yingzhinong61@hotmail.com

Antonio Clemente: CEA-Leti, France, Antonio.CLEMENTE@cea.fr

Enrica Martini: University of Siena, Italy, martini@dii.unisi.it

Important Dates

Submission deadline: 31 July 2026