Call for Papers

<u>Positioning and Sensing for Near Filed (NF)-driven Internet-of-Everything</u>

The advent of sixth-generation (6G) enabled positioning and sensing in Internet of everything (IoE) marks a transformative era in telecommunications, poised to improve data rates, latency, and reliability significantly. These advancements are propelled by the integration of ground breaking technologies like ultra-massive multiple-input-multiple-output (UM-MIMO), cell-free massive MIMO, reconfigurable intelligent surface (RIS), cognitive radio (CR) networks and terahertz communications. A pivotal shift in this progression is the transition to near-field (NF) communication, necessitated by adopting large aperture arrays. Unlike conventional far-field (FF) propagation, NF communication employs spherical wavefronts, offering several advantages over planar waves used in FF communications. One of the key benefits of spherical waves in NF communication is their energy efficiency, as they require less energy for data transmission over short distances due to rapid decay with distance. This characteristic is crucial for applications requiring high data rates and low latency, such as virtual reality, augmented reality, and industrial automation. Moreover, the spherical nature of the wavefront allows for precise localization based on the phase and amplitude of the received signal, making NF communication ideal for applications like indoor navigation and tracking. Despite the remarkable technical advancements towards 6G networks, the challenge of efficient positioning and sensing for IoE remains formidable. Note that conventional satellite-based positioning systems, like the global positioning system, face limitations in their application to emerging technologies due to extended transmission distances and unsatisfactory indoor performance resulting from complex propagation environments such as building/wall blockages. Therefore, a multifaceted approach is required that involves innovative designs for energy-efficient and spectrum-efficient transmission, thorough analysis, evaluation, experimentation, testing, and seamless integration of cognitive techniques, especially for efficient positioning and sensing under the NF-driven networks. These techniques include advanced machine learning algorithms for dynamic network optimization, AI-driven adaptive modulation and coding for real-time traffic demands, and context-aware resource management to maximize network efficiency and minimize energy consumption. Furthermore, IoE communications in NF networks must address the unique characteristics of spherical wavefronts, such as their rapid spatial variations and the need for precise beam alignment. This requirement opens up new research avenues in beamforming strategies, antenna design, and signal processing techniques specifically tailored for NF environments. The integration of IoE strategies with NF communication not only optimizes network performance but also paves the way for innovative applications such as immersive telepresence, ultra-precise industrial control systems, and next-generation IoT ecosystems. These applications demand not only high throughput and low latency but also intelligent network behavior to adapt to varying user requirements and environmental conditions for efficient positioning/sensing. Consequently, the transition to the radiating NF region necessitates a re-evaluation of existing wireless sensing, localization; beam focusing, communication and signal processing techniques towards developing an efficient positioning and sensing in IoE communication networks. In addition to this, the study of NF for IoE is still in its early stages, and there is a need for further research to fully understand its potential and challenges to support IoE communication. This special issue aims to bring together researchers from academia, industry, and government to explore these challenges and discuss future research directions in designing and shaping the next generation positioning/sensing techniques following NF assumptions. The topics of interest include, but are not limited to:

- mm-Wave and THz systems for positioning and sensing in IoE networks
- Reconfigurable intelligent surface (RIS)-assisted positioning and sensing in NF-driven IoE networks
- Resource allocation and network designs for positioning and sensing in under NF communications
- Hybrid FF and NF designs for efficient positioning and sensing in IoE
- Integrated sensing and communications (ISAC) in NF-driven IoE networks
- Physics- and electromagnetic-compliant modelling for NF-driven IoE networks
- Channel state information (CSI) in advanced NF-driven IoE networks
- CR based spectrum sharing in NF-driven IoE networks
- Semantic communications in NF-driven IoE networks
- NF-supported symbiotic communication for IoE
- Low-overhead beam training scheme for positioning and sensing in IoE
- Low cost and energy efficient hardware architecture design for positioning and sensing in IoE
- Internet of vehicles (IoV)/vehicle to vehicle (V2V)/ vehicle to infrastructure (V2I)/vehicle to everything (V2X) in NF-driven networks
- Machine learning driven techniques/designs for efficient positioning and sensing in NF-driven IoE networks
- Low-complexity beamforming design for efficient positioning and sensing in NF-driven IoE networks
- Resource management towards efficient positioning and sensing in NF-driven IoE networks
- Secure wireless communication in NF-driven IoE networks
- Definition of uses cases, application scenarios, and techno-economic analysis
- Real testbed and validation

Submission Guidelines:

All original manuscripts or revisions to the IEEE IoT Journal must be submitted electronically through IEEE Manuscript Central, http://mc.manuscriptcentral.com/iot. When the authors reach the "Article Type" step in the submission process, they should select "SI: Positioning and Sensing for Near Filed (NF)-driven Internet-of-Everything." Solicited original submissions must not be currently under consideration for publication in other venues. Author guidelines and submission information can be found at http://ieee-iotj.org/guidelines-for-authors/.

Important Dates

Manuscript Submission Deadline: ~~December 31st, 2024~~   Acceptance Notification: May 1st 2025
Extended Submission Deadline: January 15th, 2025
First Decision Notification: February 28th 2025   Final Manuscript Due: May 15th, 2025
Revised Manuscript Due: April 1st 2025   Publication Date: July 2025

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