

IEEE AP-Society Distinguished Lecturer Talk

Restoration Strategies for the Radiation Pattern of a 5G mmWave 1×4 Antenna Array Integrated into a Smartphone Professor Chow-Yen-Desmond Sim Feng Chia University, Taiwan

Date : 6 August 2025 (Wednesday)
Time : 2:00 pm – 3:30 pm
Venue : Room 15-202, 15/F, State Key Laboratory of Terahertz and Millimeter Waves,
Lau Ming Wai Academic Building, City University of Hong Kong

Abstract

Integrating a 5G mmWave 1×4 antenna array into a smartphone presents considerable challenges for antenna engineers. Factors such as nearby components, the device's compact design, and the radome can significantly impair essential performance metrics. These impairments may lead to distorted radiation patterns, decreased gain and efficiency, impedance mismatches, and reduced isolation, all of which negatively affect the overall system performance. Despite the significance of these challenges, current research offers limited guidance on effective strategies for restoring performance when incorporating a 5G mmWave 1×4 antenna array into the smartphone's side frame. This presentation will address the implications of these integration difficulties and propose a systematic method for alleviating their negative impacts. Special attention will be given to restoring radiation patterns and gain to achieve optimal antenna functionality. To illustrate these concepts, simulated case studies will be shared, demonstrating the efficacy of the proposed solutions. In conclusion, we will also explore recent discoveries involving the integration of a metasurface layer with a glass cover to achieve electromagnetic transparency for a 5G mmWave 1×4 antenna array integrating into a smartphone. By concurrently optimizing the antenna, metasurface, and smartphone cover, we successfully mitigated the adverse impacts of the cover case, as detailed in our experiments, resulting in enhanced bandwidth and impressive beam coverage.

Biography



Prof. SIM Chow-Yen-Desmond was born in Singapore in Feb. 1971. He received a B.S. degree in electrical and electronic engineering from the University of Leicester, Leicester, UK, in 1998, and a Ph.D. degree in the radio system group from the University of Leicester, in 2003. He was with the Feng Chia University, Taiwan, until July 2025, and since August 2025, he is with the National Sun Yat-sen University. His research interests mainly include small antenna designs and RFID applications, focusing on 5G sub-6GHz/mmWave antenna, RFID antenna, antenna array, and laptop antenna. He has published over 220 SCI journal papers based on the abovementioned research. Prof. Sim is a Fellow of the Institute of Engineering and Technology (FIET), a Fellow of the IEEE Antennas and Propagation Society (FIEEE), a Fellow of the Asia-Pacific Artificial Intelligence Association (FAAIA), a Life-Fellow of the WAMS-Society, and a Life Member of the IAET. He was an Associate Editor (AE) of the IEEE Access during 2015/08-2022/01, and has served as the AE of IEEE AWPL during 2017/08-2023/08. He is now serving as the AE of IEEE Journal of RFID, IEEE Open Journal of Antenna and Propagation, and International Journal of RF and Microwave Computer-Aided Engineering. He has served as a member of organizing committees of many conferences, such as General Chair/Co-Chair and TPC Chair/Member, etc. He was recently invited to serve as the Workshop/Tutorial/Invited Speaker in many conferences. He has served as the Chapter Chair of the IEEE AP-Society, Taipei Chapter (2016/2017) and the founding Chapter Chair of the IEEE Council of RFID, Taipei Chapter (2017-2020). He received the IEEE APS Outstanding Reviewer Award (IEEE Transaction Antennas and Propagation) for eight consecutive years between 2014 and 2021. He also received the Outstanding Associate Editor Award from the IEEE Antennas Wireless and Propagation Letters in July 2018. Prof. Sim was appointed as the Distinguished Lecturer of the IEEE AP-Society, serving from 2024 to 2026.

*** ALL ARE WELCOME ***

Enquiries:

Prof. Hang Wong, Department of Electrical Engineering, City University of Hong Kong
Email: hang.wong@cityu.edu.hk