Name	Job Title	Area of Expertise
Guan Chai Eu	Assistant Professor	Antenna and Wave Propagation

1. Main Research Topics

Commercial services for the fifth-generation mobile communication system (5G) were launched throughout the world in 2020, setting the stage for the rise of new industries and applications. At the same time, debates around the 6G communication network design for Beyond 5G/6G are gaining momentum. As we progress toward the continued development of Society 5.0, which supports sustainable communication, there is an increasing demand for high-frequency devices with broader bandwidth, higher performance, and more compactness.

My research aims to meet these industry demands by developing novel communication system components such as antennas, Reconfigurable Intelligent Surfaces (RIS) reflectors, and high-frequency devices.

■ My Research Topics

① Development of Circular Polarized Antenna for High-Capacity Communication System

We are pursuing research on wideband smart antennas for next-generation mobile communication systems, having a focus on Beyond 5G. I am working on designing smart antennas for high-speed, high-capacity wireless communication in the Sub-6 GHz bands (3.7 GHz and 4.5 GHz). Also, I am conducting research in areas such as frequency selectivity and polarization diversity in the antenna to meet demands from the industry.

② Development of Reconfigurable Intelligent Surface Reflector

To establish a connection between non-terrestrial networks (NTN) and terrestrial networks (TN), polarization consistency must be maintained across the network. My research intends to study the conversion mechanism from linear to circular polarization in Reconfigurable Intelligent Surfaces (RIS) reflectors, as well as to create RIS reflectors that can serve as interfaces for seamless wireless communication between NTN and TN.

③ 360° Phase Shifter

Phase shifters are used to concentrate antenna radiation in a certain direction by producing incident waves whose phase was shifted by a specific angle in relation to the input signal. We have developed a compact phase shifter that can control the phase of the incident waves continuously from 0 to 360 degrees.

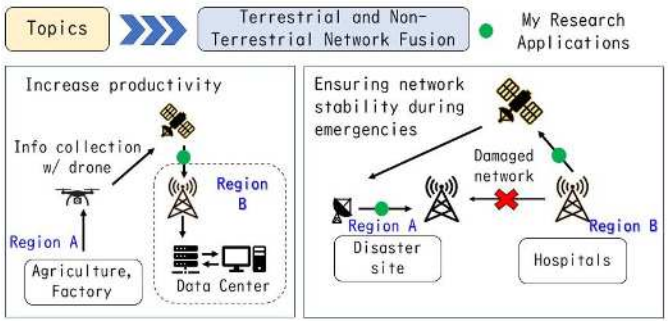

Figure 1 Network connection between TN and NTN.

2. Keywords

Local 5G、non-terrestrial network、circularly polarized antenna、RIS reflector、high-frequency devives.

3. Remarks and Websites

Research Achievements: My research outcomes are published in academic journals and international conferences. For more details, please visit the following research map link below.

Future Outlook: The number of B
eyond 5G-related IoT devices and the AI market size will continue to grow in future. In response to the growing demands of smart agriculture and automated/semi-automated factories, we are focusing on the development of communication devices operating in the microwave band.

For those considering research collaboration, let's work together on the following topics to develop high performance passive microwave-band devices and antennas: (1) Wide Bandwidth. (2) Multifunctional antenna. (3) Size miniaturization. (4) Optimization of other performance characteristics.

researchmap： https://researchmap.jp/guance