

Title of the Workshop:

Integrating FR2 OAI and Dynamic RIS: Enhanced Network Management
Implementing FR2 OAI, ORAN, MIMO, and RIS

Workshop Organizers:

TMY Technology Inc. (TMYTEK) is the main organizer and Vincent Lee, TMYTEK Sales Manager, will introduce all invited speakers and provide an overview of the topic during the workshop.

TMY Technology, Inc. (TMYTEK) delivers the breakthroughs of mmWave solutions in 5G/B5G and satellite communication applications. By transforming the mmWave RF fronted with innovative devices, inventing ready-to-use beamforming development kit, implementing phased arrays with modern Antenna-in-Package (AiP) technology, and redefining the OTA testing methodology, TMYTEK empowers industrial inventions to market faster.

Vincent Lee has been with TMYTEK since 2019. He works closely with European universities, delivering cutting-edge 5G mmWave prototyping platforms for antenna verification and wireless communication. Vincent's deep understanding of the industry's complexities and trends, combined with his commitment to expanding internet access using TMYTEK's state-of-the-art technology, makes him a valuable asset to the company's mission. Vincent's leadership and sales abilities have contributed to the growth and success of TMYTEK., earning him respect in the industry.

Contact person: Ariel Chiang (ariel_chiang@tmytek.com), Regional Marketing Coordinator

Scope and topics of the workshop:

This workshop will focus on the integration of FR1/FR2 OpenAirInterface (OAI) with advanced technologies such as ORAN, MIMO, and RIS. We will explore the application of Dynamic RIS in the ORAN architecture for intelligent RAN control and MIMO's role in enhancing network capacity and throughput. A key focus will be placed on innovative MIMO strategies for beam management and resource allocation. We will offer an in-depth overview of scalable and efficient solutions for high-frequency networks, examining topics such as beamforming, resource allocation, and real-world deployment strategies, making it highly relevant to the communication community.

The workshop will feature contributions from academia, industry, and research institutions from Europe, the United States, and Taiwan. We will prioritize a diverse representation of voices, especially from underrepresented regions and professional backgrounds, to ensure a globally relevant discussion on high-frequency networks.

Rationale

- **Why is the topic current and important?**

As the demand for high-frequency (FR2) networks increases with the advancement of 5G and beyond, there is an urgent need for flexible, scalable, and intelligent solutions. Integrating Dynamic RIS and MIMO with OpenAirInterface (OAI) in FR2 environments presents great potential for improving network management and capacity. MIMO enhances multi-stream data transmission, boosting efficiency. These technologies are essential for meeting the complex demands of modern communication systems, making this workshop timely and crucial for those engaged in communications technologies.

- **Why will the workshop attract a significant number of submissions of good quality?**

The workshop's focus on the integration of FR2 OAI with ORAN, MIMO, and Dynamic RIS presents cutting-edge topics for researchers, engineers, and technologists. The workshop will appeal to a broad audience due to its inclusion of both theoretical advancements and practical implementations. We aim to provide valuable insights into optimizing high-frequency networks, addressing real-world challenges in deployment and performance.

- **Why will the workshop attract a large number of attendees, in addition to the authors?**

This workshop covers critical components of 5G and future network technologies, such as the OAI platform, Reconfigurable Intelligent Surface (RIS), ORAN for network deployment, and MIMO for improving network capacity. These technologies are vital for overcoming challenges related to scalability and performance in high-frequency networks. For practitioners, the workshop will provide practical tools and insights to enhance network design, management, and deployment. Additionally, the participation of industry leaders and academics ensures that attendees will be exposed to cutting-edge research and real-world applications.

- **How does the workshop differ from others, i.e., related workshops and conferences of similar topics?**

While other workshops may discuss OAI or ORAN individually, this one focuses on the combined application of FR2 technology with MIMO and Dynamic RIS. It will emphasize practical demonstrations and real-world applications, featuring unique insights into intelligent RAN control and optimized network capacity through MIMO. The workshop will feature the integration of advanced systems that have yet to be explored in-depth at similar conferences, providing attendees with actionable knowledge and practical deployment strategies.

A short biography of the organizers

TMY Technology, Inc. (TMYTEK) is an innovator and a game-changer that delivers the breakthroughs of millimeter-wave solutions in 5G/B5G and satellite communication applications to worldwide clients. As a leading technology developer, TMYTEK enables people's everyday life with better connectivity from our clients' products. By transforming the mmWave RF fronted with innovative devices, inventing ready-to-use beamforming development kit, implementing phased arrays with modern Antenna-in-Package (AiP) technology, and redefining the OTA testing methodology, TMYTEK empowers industrial inventions to market faster. Together with our global partners and allies, we make historical firsts and positively impact society.

Names of potential participants: invited speakers

Participants will include telecommunication engineers and experts interested in 5G and future network technologies, researchers and academics in wireless communication, network management personnel, industry technologists from related fields like IoT and smart cities, representatives from standardization and regulatory bodies, and startups and innovators focused on telecom and network management solutions.

This workshop delves into the cutting-edge technologies shaping the future of 5G and beyond, with a focus on the practical implementation of FR2 OpenAirInterface (OAI) structures, ORAN functionalities, and advanced applications such as ISAC and MIMO. Featuring presentations from industry leaders like Emerson (Origin NI), TMYTEK and allbesmart, and academic insights from the University of Hawaii, and Fraunhofer Heinrich Hertz Institute (HHI), the session offers a comprehensive exploration of the latest telecom innovations. Attendees will benefit from demonstrations and interactive discussions on future applications, gaining valuable insights into emerging trends and practical deployment strategies.

Planned format of the workshop

- **3 hrs Workshop and Schedule**

45 mins - Session 1. Integrating FR2 OAI and Hybrid RIS: Enhanced Network Management implementing FR2 OAI, ORAN, and RIS

This session explores integrating FR2 OAI with the O-RAN architecture, highlighting Dynamic RIS and MIMO for enhancing network capacity. Attendees will learn about advanced beamforming, efficient resource allocation, and practical deployment strategies.

Speaker: Vincent Lee, TMYTEK Sales Manager

35 mins - Session 2. Implementation of an Open-Source 5G SA FR2 End-to-End Testbed with the USRP

This presentation profiles a 5G SA FR2 end-to-end testbed using National Instruments USRP X410 radio and Allbesmart network device, operating in the FR2 band. The testbed, utilizing open-source software like UHD driver, Eurecom OAI 5G stack, and OAIBOX software, includes two UE implementations: one with a USRP radio and another with a modem module. The presentation will highlight system configuration, operation, performance, and throughput.

Speaker: Neel Pandeya, Emerson (NI)

35 mins - Session 3. OAIBOX, a 5G NR SA testing solution for research labs
Allbesmart's FR1 OAI technique involves leveraging the OpenAirInterface (OAI) framework to develop and test 5G network functionalities within the FR1 frequency range. By utilizing open-source software and customizable solutions, Allbesmart enables efficient and flexible network testing, enabling compatibility and performance optimization for various use cases.

Speaker: Paulo Marques, Allbesmart

35 mins - Session 4. World's first FR2 OAI 5G NR SA 2x2 MIMO Testbed
Introducing the world's first FR2 OAI 5G NR SA 2x2 MIMO Testbed. This groundbreaking millimeter-wave ORAN open-source platform, known as FR2-OAI, was developed in collaboration with strategic partners TMY Technology Inc. (TMYTEK), National Instruments (NI) and Allbesmart. Together, they successfully created the first stable 2x2 MIMO millimeter-wave end-to-end solution, pioneering advancements in 5G technology.

Speaker: Matthias Mehlhose, Fraunhofer Heinrich Hertz Institute (HHI)