

Theme: 6G Communication

- Sub Theme: Envelope tracking transmitter in hybrid beamforming system

Envelope tracking (ET) is a well-established technique that improves the efficiency of RF power amplifiers (PAs) compared to conventional class-AB or class-B operation. ET PA is widely used for handset, but Doherty PA architecture is mainly used in base station. Doherty PA can achieve relatively good efficiency with full loading scenario but efficiency can be decreased with higher PAPR or reduced traffic loading condition.

For upper-mid band 6G, the number of antennas will be increased, and hybrid beamforming is being considered with wider bandwidth. PA efficiency will be more important in overall system implementation in this scenario. Typically, supply modulator switching speed has certain limitations, and efficiency will decrease with higher switching frequency. And more complex digital predistorter (DPD) will be needed to linearize multiple PAs in an array together with ET operation. We are looking for novel contributions on the following topics:

- 1) ET supply modulator
 - a. High-efficiency Analog Supply Modulator for Wide-band Signals
Solutions are required to use Analog ET implementation for wide bandwidth (>500MHz) with or without innovative bandwidth reduction algorithms.
 - b. High-efficiency Digital Supply Modulator for Wide-band Signals
Innovative solutions are required to increase the switching speed to support wide bandwidth.
 - c. ET in Beamforming System
To control cost and complexity in a hybrid beamforming system, one supply modulator chip is required to be shared with multiple power amplifiers.
 - d. Upper Mid-Band PA Solutions

High-efficiency PA architecture for the new frequency band at 13GHz are needed for the upcoming 6G bands. The amplifiers need to support wide bandwidth of 1GHz and support high PAPR.

2) Advanced DPD

a. DPD for Hybrid BF System

Solutions for linearization of a phased array system with one DAC in the context of Hybrid MU-MIMO.

b. DPD for Digital ET.

Development of linearization models for PAs utilizing digital ET.

c. DPD Complexity Reduction

Reduction in linearization complexity, especially when considering hybrid beamforming, digital ET, and wide bandwidth signals.

※ *The topics are not limited to the above examples and the participants are encouraged to propose the original idea.*

※ *Funding: Up to USD 150,000 per year*