

## Modular Smart Antenna-RF Front End System for Handheld Devices and Base Stations

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### SUMMARY

UCLA researchers in the department of Electrical Engineering have developed a novel modular implementation of a radio frequency (RF) front end system that simplifies the design of active antenna systems for base station applications and enables users to demonstrate the seamless integration of an antenna to their RF front end chipsets.

### BACKGROUND

As electronic devices are becoming smaller, systems components are being placed closer to each other in order to conserve space. From this, the problem of interactions among these electronic components arises. In transmissions systems, this interaction occurs between the antenna and the RF front end chipset. The current method of solving this issue is to design a wideband system that allows for such interactions. However, to realize stable, pure, long-range communication, the demand in narrow band frequency is increasing and systems are required to be highly efficient. It is therefore essential to provide isolation between different components of a system while conserving space in order to design more efficient products.

In current antenna and front end systems, each component is designed independently, with this isolation making it difficult to demonstrate effectiveness of chipsets. When these components are brought within working distance of the antennas, they may disrupt the mutual coupling within the antenna and cause detuning. Makers of RF front end systems thus only demonstrate their chipset as a standalone to their customers. A system that would enable companies to demonstrate to their customers the interaction of these chipsets with their antennas easily and without having to understand the remaining parts of the system could increase customer confidence and therefore increase sales and revenue.

### INNOVATION

UCLA researchers have developed a modular implementation of RF front end systems. This invention both enables users to demonstrate the seamless integration of an antenna to their RF Front End chipsets and simplifies the design of active antenna systems for base station applications. This system includes a transceiver for transmitting and receiving signals, a dual band antenna antenna, and a duplexer. The transceiver is capable of modulating outgoing baseband signals and demodulating received signals to baseband, and the duplexer is used to provide frequency selective distribution of the received signals and sends the transmitting signals to the antenna while providing isolation between transmitted and received signals. The transceiver system and the antenna do not couple with each other and as a result, do not distort the transmitted or received signals.

### APPLICATIONS

- ▶ Chipset design and demonstration
- ▶ Active and smart antenna systems for base stations

### ADVANTAGES

- ▶ No coupling / distortion between the transceiver system and the antenna
- ▶ Integration engineers do not need to know the details of the transceiver system or the antenna in order to demonstrate this system

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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

communications, telecommunications,  
narrow band, broadband, RF, front  
end, wireless, antenna, smart  
antenna, active antenna, chipsets,  
transceiver

#### CATEGORIZED AS

- ▶ **Communications**
- ▶ Other
- ▶ Wireless

#### RELATED CASES

2013-842-0

## STATE OF DEVELOPMENT

This system has been fully conceptualized, modeled, and simulated. A working prototype is under development with ongoing plans for implementation and performance enhancement.

## PATENT STATUS

Patent Pending

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