**Wideband Transmit Noise Suppression in STAR System with UWB Arrays**

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Future wireless communication systems will require much higher data rates. Also, due to increased consumer demand, additional but discontinuous frequency bands will be allocated for commercial use. This presents us with an opportunity to design novel transceiver architectures and duplexing techniques to combat the ever-increasing spectrum demands. One of the techniques to enhance spectrum access is Simultaneous Transmit and Receive (STAR) by concurrent transmission and reception across same frequency band.

Due to its in-band full duplex mode of operation, high power transmitted signals couple into the receiver, thus crippling receiver performance and preventing consistent reception. Therefore, implementation of STAR requires significant isolation between transmit and receive signals. Coupling is drastically increased when multiple transmitters and receivers are collocated in a low profile array setup, requiring as much as -120dB of isolation.

With this in mind, a novel STAR architecture operating in an array environment was recently proposed with four stages of cancellation to achieve a greater measure of self-interference cancellation (SIC) over a wider bandwidth. Antenna isolation (stage 1) of 30dB is achieved by exploiting polarity diversity using spiral antenna arrays. At the RF stage (stage 2), cancellation is achieved using FIR filter banks placed right after the antenna.

One way to cancel the transmit noise is to directly sample it from its source and cancel its effect. As a result, reconfigurable multi-input self-interference cancellation (SIC) filter are employed to suppress coupled signals (direct +noise +harmonics) from nearby transmit elements by ~40dB. This is achieved by connecting each of the filter's input to an adjacent transmit chain. Consequently, the designed RF filter bank, sources the replica of the transmit signal and its noise component from all the transmit chains in order to provide the desired isolation of at least 40dB.

Additional cancellation is achieved at each stage at the analog baseband, and at the digital back-end. Thus, the proposed STAR system provides a combined suppression of at least 100dB across a bandwidth of 1GHz. At the conference, we will show the cancellation of high power coupled transmit signals and noise at the first 2 stages. Specifically, we will present the design, and implementation of the adaptive RF filter to achieve the noted cancellation of uncorrelated transmit noise and signal.