Docket #: S13-276

Full Duplex MIMO Radios

Engineers in Prof. Sachin Katti's laboratory have developed a 3 X 3 in-band full duplex MIMO radio, that can simultaneously transmit and receive on the same channel using standard WiFi 802.11n PHY for 20 Mhz bandwidth. This technology uses a single antenna for each MIMO stream to achieve close to the theoretical doubling of throughput in all practical deployment scenarios. This invention builds on the interdisciplinary SISO self-cancellation technology (described in Stanford Docket S13-277) with a scalable design that neutralizes cross-talk between the different antennas and also cancels non-linear distortion.

Stage of Research
Prototype – The inventors built analog circuit boards and integrated them with a off-the-shelf, fully WiFi-PHY compatible WARP software radio implementation. They demonstrated robust performance (leaves 1 dB of self-interference) in noisy indoor environments with close to the expected theoretical doubling of throughput.

Applications

- **Wireless communications**

Advantages

- **Increased throughput** - 88% throughput gain over half duplex radios using standard WiFi compliant OFDM PHY of 20 MHz
- **Single antenna** with simultaneous transmission and receiving for each MIMO stream (the same resources as standard MIMO half duplex)
- **Scalable design** for both analog and digital self-cancellation schemes
- **Cancels non-linear distortion** (e.g. gain phase imbalance and memory modeling of non-linear components)

Publications

- Dinesh Bharadia and Sachin Katti, "Full Duplex MIMO Radios",*USENIX NSDI 2014*

Patents

- Published Application: WO2015048678
- Published Application: 20160226653

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