Syndicated Test Bench Set-Up for Testing of Real-Time Reconfigurable Power Amplifiers for the Next Generation Radar

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In the contested and congested spectral environment, multiple applications compete for bandwidth. As a result, power amplifiers for the next-generation radar must be adaptive and reconfigurable. This presentation describes the development of a dual test bench setup at two sites, Baylor University and the Army Research Laboratory, to allow for joint innovation of circuitry and circuit and waveform optimization techniques for real-time reconfigurable radar power amplifiers and filters. The setup of each bench includes a signal generator, voltage supplies, power meter, and spectrum analyzer for the purposes of simulating a radar waveform, reconfiguring voltage-controlled circuitry and biasing the amplifier, measuring the efficiency of the power amplifier, and measuring the spectrum compliance of the system, respectively. Each setup contains a mounted Microwave Technologies MWT-173 field-effect transistor (FET) and identically designed tunable-varactor matching networks. As testing on these dual setups continues forward, advanced reconfigurable matching networks using high-power tuner technologies will be jointly co-measured at the two sites.

The test bench used at Baylor University was replicated at the Army Research Laboratory by compiling the necessary hardware and software for the system, implementing previously designed circuit and waveform optimization algorithms on the new system, fabricating “round-robin” circuitry to be sent back and forth between the two sites, and training new users to operate the system. The benefits of a syndicated test bench setup include the ability to test a greater variety of devices, expand operation to higher frequency ranges, and most importantly, facilitate collaboration leading to joint innovation. Results of initial testing comparisons between the Baylor and ARL setups are discussed. These results demonstrate that the dual test bench setups are functional and initial tests of the same device at each site yielded comparable measurements. The dual test bench setup will continue to be used to develop new circuitry and optimization techniques for real-time reconfigurable power amplifiers for the Next Generation Radar.