Project: Wideband Multifunctional Software Defined Radio (WMSDR) : 5G/6G

Problem: The WMSDR project seeks to provide a 5G/6G solution for adaptive wideband transceiver architectures and components. Adaptive wide band, reconfigurable, multifunction RF transceivers that meet DoW 5G/6G needs are neither readily available, nor produced in the U.S. Current approaches require multiple radio solutions that are narrow-band, high SWaP-C (Size, Weight, Power, and Cost), and negatively impact performance/effectiveness and sacrifice flexibility/resistance to interference. Transceiver instantaneous bandwidths are limited to ~1GHz and consume significant power for performance. DoW has unique reliability, environmental, security, and other trusted-source needs for 5G/6G.

Solution: The WMSDR solution will enable a low SWaP-C, highly integrated wideband SDR that can successfully operate in contested and congested environments. WMSDR will enable a low power small form factor software defined radio enabling: (1) simultaneous real-time spectral wideband field of view, (2) chip-scale wideband frontend with self-tuning filters for interferer mitigation and performance optimization, (3) electronically steerable array integrated with advanced Intel transceiver with 16 Rx/Tx channels for beam steering and RF MIMO solutions that is designed to scale to higher element counts, and (4) real-time, low-latency DSP array leveraging a massively parallel architecture for high instantaneous bandwidth and low power. The domestically produced solution will combine a Wideband Adaptive RF Front End Assembly (WFA) with an Intel 18A-based transceiver designed for 5G/6G application in the FR1, FR2 and FR3 bands. This effort is expected to mature heterogeneous RF reconfigurable filters and multi-function transceiver architecture from a current TRL/MRL of 4 to a TRL/MRL of 6 by the end of the project.

Project Performers / Role:

- **Lockheed Martin:** Project prime. LM will demonstrate integrated low SWaP-C state-of-the art autonomous controlled RF front end with the reconfigurable transceiver prototype.
- **Purdue University**: Design and deliver ASIC autonomous filter controller.
- **University of Dayton and CapV:** Design Barium Strontium Titanate (BST) varactor tuning elements.
- **Indiana Microelectronics**: Design WFA filters based on the BST varactors.
- **3D Glass Solutions**: Design and deliver a Heterogeneous Integrated (HI) filter package incorporating WFA filters and filter controller ASIC.
- **Intel** will develop, fabricate, and deliver a new wideband reconfigurable transceiver and support integration and demonstration activities.

PURDUE UNIVERSITY

LOCKHEED MARTIN

3DGS

intel

INDIANA MICROELECTRONICS, LLC

University of Dayton