The Future of the Electromagnetic Spectrum

Abstract:

The U.S. Defense Advanced Research Projects Agency (DARPA) has had a long history in foreshadowing large scale shifts in technology, including RF systems. For example, the creation of GaAs and then later GaN technologies have changed the power transmitter technologies and antenna subsystems that are the heart of most RF systems today. This talk will discuss the more recent programs in the DARPA microsystems technology area, with a focus on emerging applications driving the community forward. The presentation will then discuss specific electronics technologies which are pacing these developments, with a special emphasis on array and antenna technologies. The status of phase change materials, advanced digital beamforming, and adaptable antennas will be shown, with a projection of what they will enable moving forward.

Bio sketch:

Dr. William Chappell is director of DARPA's Microsystems Technology Office (MTO). Serving in this position since June 2014, he has focused the office on three key thrusts important to national security: ensuring unfettered use of the electromagnetic spectrum, building an alternative business model for acquiring advanced DoD electronics that feature built-in trust, and developing circuit architectures for next-generation machine learning. Prior to his role as MTO director, he managed DARPA programs on adaptable radio frequency (RF) systems and low-cost antenna array technologies. Before joining DARPA, he served as a professor in the Electrical and Computer Engineering department of Purdue University, where he led the Integrated Design of Electromagnetically-Applied Systems (IDEAS) Laboratory. His research focused on high-frequency components, specifically the unique integration of RF and microwave components based on electromagnetic analysis. He served as the advisor for several best paper finalists at the International Microwave Symposium, hosted by the Institute of Electrical and Electronics Engineers (IEEE) Microwave Theory and Techniques Society. He has coauthored two best papers at the GOMACTech conference and, in 2009, his paper on wearable, multiple-input and multiple-output systems was selected for the best journal paper at that year's conference of the IEEE Vehicular Technology Society. He received his Bachelor of Science (summa cum laude), Master of Science, and Doctorate of Philosophy degrees in Electrical Engineering, all from the University of Michigan.