

GUEST BLOG: Achieving RF spectrum overmatch

Blog

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Secure and protected tactical communication solutions are empowering the warfighter to achieve mission objectives, even as they come under electronic attack. As the modern electromagnetic battlespace rapidly evolves, the stakes for robust and resilient tactical communications networks across mission-critical defense applications have never been higher. As near-peer adversaries continue to develop and deploy advanced electronic warfare (EW) capabilities, traditional radio systems have struggled to adapt to these new and unique operational challenges. In the future fight, the warfighter's ability to operate in congested and contested radio frequency (RF) spectrum environments and persist in the presence of adversarial jamming and interference has emerged as a critical need.



The good news is that software-defined radio (SDR) technology has evolved to keep pace with this dynamically changing tempo, with solutions that continue to innovate to meet these emerging challenges. Among recent radio innovations is the rise of advanced mobile ad hoc network (MANET) radios and multiple input/multiple output (MIMO) waveform technology. These technologies are at the forefront of the warfighter's ability to achieve mission objectives across multiple domains, with capabilities ranging from creating massively scalable mesh networks that deliver data connectivity to hundreds of soldiers at the tactical edge, to creating secure and protected command-and-control and communications networks for unmanned systems, to connecting sensors to shooters through integrated air- and missile-defense platforms.

In addition to providing high-performance networking capabilities, tactical communication systems have integrated cutting-edge low probability of intercept/low probability of detection and antijamming resiliency capabilities that are purpose-built for operations in austere environments. Features such as MANET power control (MAN-PC), MANET interference avoidance (MAN-IA), and MANET interference cancellation (MAN-IC) play an essential role in minimizing the RF footprint, monitoring the RF spectrum for interference, and moving entire networks to cleaner frequencies without user intervention or having to resort to sophisticated spatial signal processing techniques to nullify an offending interfering signal.

Advanced MANET radios and MIMO waveform technology are now being rapidly adopted by the U.S. Department of Defense (DoD) to support key modernization efforts and enable Joint All-Domain Command and Control (JADC2) across the spectrum of operations. As a fundamental component of U.S. Army initiatives, MANET radios support the Army's Next-Generation Combat Vehicle (NGCV) and the Army's Integrated Tactical Network (ITN). MANET radios – currently being evaluated in conjunction with Capability Set 23 (part of the Army's incremental network modernization approach) – are being deployed to Stryker brigade combat teams (BCTs), enabling continuity of operations for mounted and dismounted formations that extend range, distance, and mobility.

MANET radios are also an integral part of the U.S. Marine Corps (USMC) operations and were recently selected for deployment in the USMC Systems Command's Networking on-the-Move (NOTM) mobile communications system. As a critical piece of the NOTM communications architecture, these MANET radios enable units to access satellite communications, connect dispersed vehicles with airborne assets and dismounted units, and facilitate transmission of critical information that increases situational awareness in hostile environments.

Despite adversarial EW advancements in a constantly changing battlespace, the rise of secure and protected tactical communications systems is providing the warfighter with the tools needed to achieve mission success in the face of multitiered electronic attacks. Today, MANET radios powered by advanced MIMO waveform technology with LPI/LPD [low probability of intercept/low probability of detection] and antijamming resiliency features are advancing the warfighter capabilities at the tactical edge, enabling them to achieve RF spectrum overmatch and decision dominance in any operational environment.

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