Monitoring the Electromagnetic Spectrum

Distributed Spectrum Analysis for Advanced Situational Awareness and Signals Intelligence Utility Infrastructure

The explosive development of commercial wireless technologies has made it possible for adversaries to have easy access to powerful, low cost, and disruptive wireless devices.

The availability and affordability of these technologies, such as GPS jammers, smartphones, communication equipment, wireless routers, and other sensors, mean aerospace & defense users need to be able to manage and control the electromagnetic (EM) spectrum. Critical communication infrastructure, GPS, unmanned vehicles, and other mission critical capabilities all depend on reliable and uninterrupted spectrum access.

As part of the larger investment in cyber and electronic warfare (EW) initiatives, users need the ability to detect opposition signals, conduct in-depth analysis to identify signal types and source location, avoid interference from friendly and malicious transmitters, and monitor the spectrum for increased situational awareness.
The Challenge

Traditional equipment and approaches for spectrum monitoring, signals intelligence, geolocation, and interference detection are no longer viable, and put soldiers at a disadvantage. The need to operate in new bands, dynamically share spectrum with other systems, and avoid RF interference means that users need a new way to effectively monitor the signal environment.

Soldiers need unimpeded access to the EM spectrum. Mission success depends on the availability and reliability of spectrum resources, especially as adversaries invest more heavily in cyber and EW capabilities.

Opposition signals are unknown, low powered, directional, and changing. They quickly adapt to new frequencies and signal structures to avoid detection using cognitive radio and artificial intelligence. Traditional equipment is unsuitable for these short duration signals (bursts), narrow pulses, or signals whose duration is based on network traffic conditions. They also lack the versatility to keep up with changing signal types and often cannot detect higher frequencies being used to avoid congestion.

Soldiers on the battlefield face threats from signals that they have no prior knowledge of and that they have not seen before. They require spectrum analysis equipment that is versatile, adaptable, and easy to deploy in a distributed wireless sensor network (WSN) in the field. They also require software that can decode and deconstruct these signals of interest to determine their characteristics, identify the source, and locate the transmitter.

QUICK FACTS

Adversaries now have easy access to a wide variety of disruptive wireless devices

Opposition signals frequently change, and are often low powered, high frequency, and directional

Traditional equipment lacks the versatility, networkability, performance, and form factor to be viable in the battlefield.
ThinkRF Real-Time Spectrum Analyzers are versatile, portable, and networked for remote and distributed deployment. Powered by innovative software-defined radio (SDR) technologies, these lightweight, low-powered, and reconfigurable units can be easily mounted onto vehicles and powered by the ThinkRF P120 Vehicular Power Conditioner, or deployed in the field for continuous, in-place monitoring.

ThinkRF analyzers can be deployed in a variety of WSN topologies depending on the mission requirements, including a hub-and-spoke, cascaded star, wireless mesh, or hybrid architecture. Soldiers gain the ability to see the full spectrum environment over a wide geographic area and view up-to-date situational awareness. With embedded GPS technology, these units know the time and location of millions of measurements and can send the data back to a central control station for deeper analysis.

ThinkRF Real-Time Spectrum Analyzers integrate seamlessly with leading third-party spectrum analysis software. The combined solution provides complete EM situational awareness, enables advanced geolocation of signal anomalies, detects the wide variety of signal types which are used in the battlefield, and allows users to manage the spectrum, extract intelligence, resolve interference, and quickly identify signals of interest.

**Benefits of ThinkRF Real-Time Spectrum Analyzers**

- Compact form-factor with low size, weight, and power requirements
- Networked for distributed deployment in a variety of network topologies
- High frequency performance from 9 kHz to 27 GHz
- Rapid sweep rate and high probability of intercept
The Results

ThinkRF Real-Time Spectrum Analyzers, when combined with leading third-party software, provide soldiers with greater situational awareness and control of the EM spectrum. In mission critical environments, soldiers can maintain critical communication infrastructure and gain a crucial advantage over adversaries who increasingly have access to a wide variety of powerful wireless technologies.

The combined solutions provide users with a complete map of the spectrum, enables troubleshooting in the field, and ensures reliable communications in critical scenarios. ThinkRF spectrum analyzers, powered by patented SDR technologies, are a cost-effective, lightweight, portable, and networkable alternative for aerospace & defense users. They are ideal for users who require distributed, modular, reprogrammable, rapidly deployable, and reconfigurable equipment for specific missions, and for situations where soldiers need to detect and identify unknown and changing signals to maintain control of the battlefield.

ABOUT THINKRF

ThinkRF is the leader in software-defined spectrum analysis solutions that monitor, detect and analyze complex waveforms in today’s rapidly evolving wireless landscape. Built on patented technology and quality by design principles, the ThinkRF platform offers greater versatility, better performance and additional capabilities for 5G, monitoring, signals intelligence (SIGINT), technical surveillance countermeasures (TSCM), and test and measurement applications. Aerospace and defense companies, spectrum regulators and wireless communications providers use the remotely deployable, PC-driven and easily-upgraded platform to replace traditional lab equipment for wireless spectrum analysis.

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