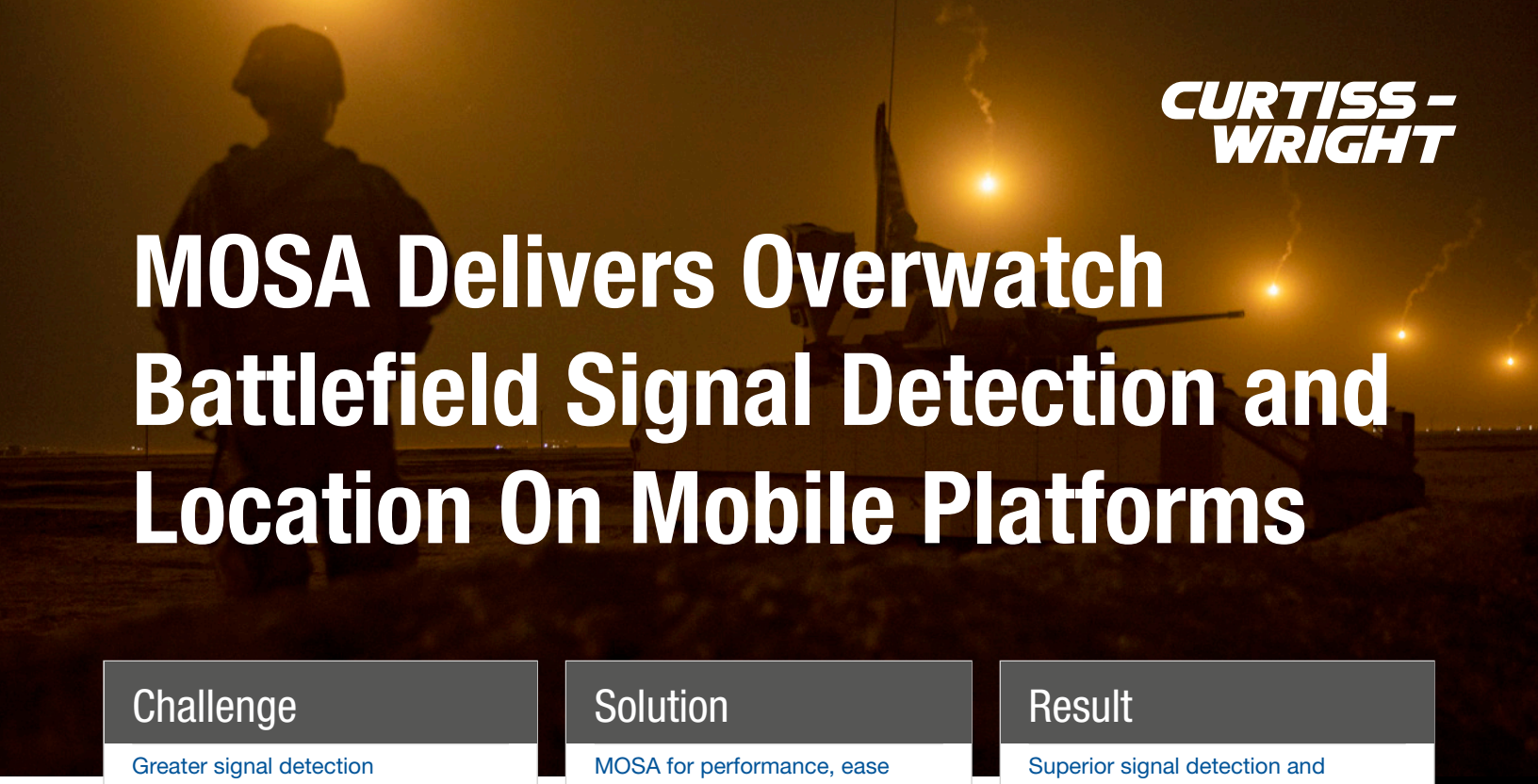

MOSA Delivers Overwatch Battlefield Signal Detection and Location On Mobile Platforms

Challenge	Solution	Result
Greater signal detection and location capability to counter near-peer threats	MOSA for performance, ease of integration, and sustained technology relevance	Superior signal detection and pinpoint locational accuracy – Platform agnostic
Platform agnostic for rapid deployment across dissimilar fleets	Leverage the latest commercially developed technology for performance and interoperability	Compliance to mandated MOSA for multi-platform compatibility, ease of insertion, and sustainable technology superiority

Challenge

To counter increasingly sophisticated threats requires new capabilities derived from modern technology. However, legacy defense systems are often not designed with upgradability in mind, making them challenging to refresh. Critical commercial systems that use scalable modular open system approaches (MOSA) enables continued relevance.

The new model for defense electronics is to grow at the speed of technology to counter evolving threats that are similarly advancing at the pace of technology. But how to do it? Let's explore this with an example to illustrate the challenge, solution, and outcome of a critical sensing system deployed across fleets of mobile platforms.

Consider intelligence surveillance reconnaissance (ISR) receivers that find and geolocate signals of interest on the battlefield, protecting warfighters with direct threat warning (DTW) capability. Existing tactical geolocation receivers have limited positional accuracy and may miss short, fleeting single-hit transmissions. To counter peer/near-peer rivals, there is an urgent need for better direction-finding (DF) and geolocation capability of HF/VHF radio signals onboard space-constrained mobile platforms.

Recognizing the widening capability gap created as near-peer rivals continue to innovate, the Department of Defense (DoD) sought a replacement multi-mission, wide-stare ISR receiver with the functionality to identify and pinpoint sophisticated battlefield signals. The need was immediate, so the receiver had to be quick to develop and platform-agnostic for easy retrofitting to various vehicles.

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Solution

To avoid “technology-lock,” the DoD specifically searched for a MOSA solution. This was in alignment with January 7, 2019, Tri-Services MOSA mandate, succinctly titled “Modular Open Systems Approaches for our Weapon Systems is a Warfighting Imperative.” The mandate required new systems to be modular and open for increased competition and innovation and to leverage the scale and vast technology investments made in the commercial sector.

The DoD found its solution in the DAEDALUS receiver. Developed by XONE, the receiver’s effectiveness lay in its modular open systems approach that leveraged the latest, high-performance heterogeneous processing building blocks. The XONE development team realized they had the technology required to achieve the DoD requirements using a miniature RF aperture rather than order-of-magnitude larger antenna arrays or triangulation across multiple platforms, as used by current tactical systems. Such an approach would exceed DoD requirements and increase mission adaptability, but only if they could achieve pinpoint signal location accuracy, which they would do through advanced signal processing software algorithms.

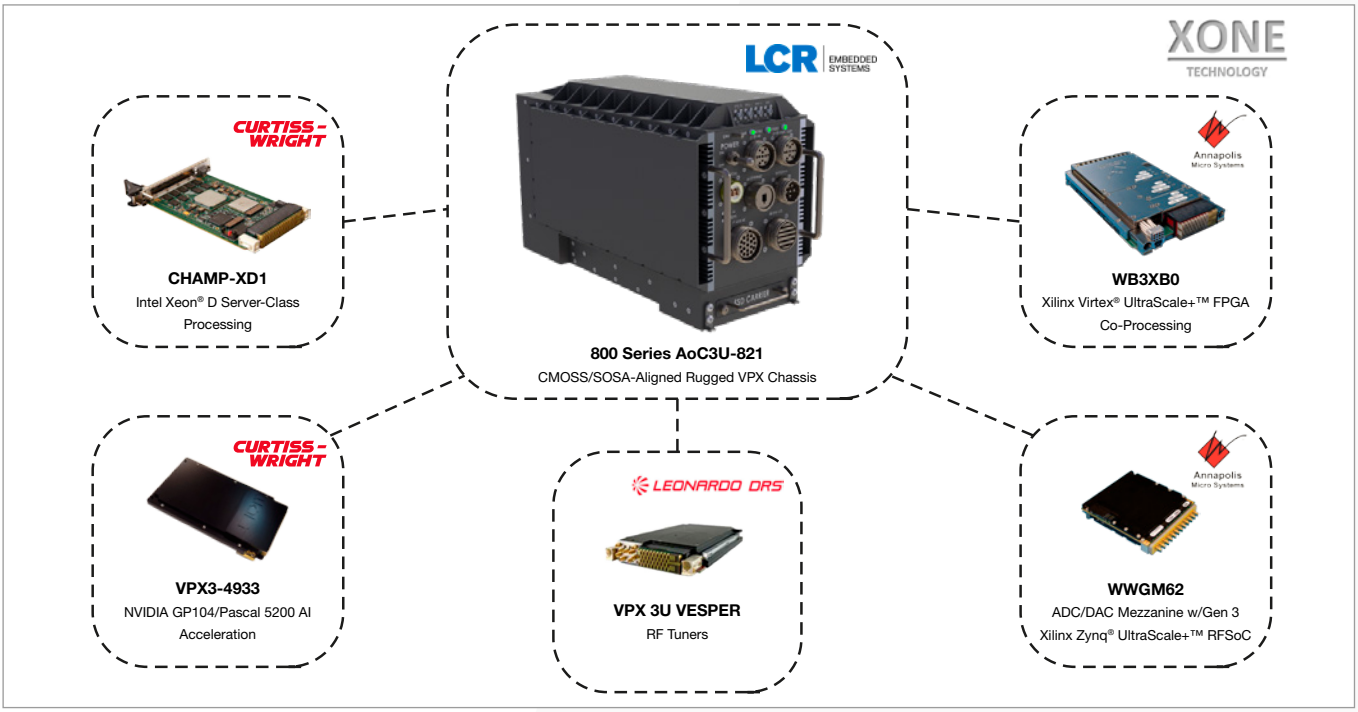
To run the necessary software required server-class processing capability, AI acceleration, low latency processing, and fast-acting tuners. XONE needed the most contemporary processing capability usually found in data centers for its performance and AI capabilities to run the necessary software. In short, all the system components had to be best-in-class for performance, interoperable, ruggedly packaged, and easy to integrate into their purpose-built receiver. Additionally, these system building blocks had to be readily available in a small form factor to fit within their target platforms.

XONE uniquely found what they needed in small, 3U VPX system building blocks available from Curtiss-Wright and Curtiss-Wright’s partners. Specifically, the DAEDALUS receiver comprises FPGA co-processing modules from Annapolis Micro Systems, RF tuners from Leonardo DRS, and the latest server-class and GPGPU co-processors with integrated artificial intelligence (AI) acceleration modules from Curtiss-Wright. Combined development teams from XONE and LCR Embedded Systems seamlessly integrated these modules into LCR’s 800 Series rugged ATR chassis. Curtiss-Wright’s CHAMP-XD1 3U VPX HPEC single board compute module is at the heart of the system. Powered by an Intel® Xeon® D processor with advanced AI and trusted boot features, this processing engine is augmented with a versatile XMC mezzanine site to deliver the processing power and connectivity required for the DAEDALUS system to perform its software tasks efficiently. The system components and chassis are Common/C4ISR/EW Modular Open Suite of Standards (CMOSS) and Sensor Open Systems Architecture-aligned (SOSA), making them interoperable across hardware, software, and interfaces, enabling the development of the DAEDALUS receiver to progress from the lab to field testing in under six months.

Result

Using a modular open systems approach, the XONE development team focused on the differentiated value they brought to the intelligence community and warfighter. By leveraging the performance of contemporary commercially developed technology to run their advanced software, the DAEDALUS receiver extracts better intelligence from battlefield signals to deliver greater situational awareness. The MOSA approach they used adhered to the requirements and intent of the Tri-Service mandate and built in the three critical requirements needed for program success:

- Functionality achieved by running advanced software on the latest performance processing hardware
  - Single antenna solution and pinpoint accuracy achieved through software for mission agility
  - High probability of signal detection, including fleeting signals for threat awareness
- Platform agnostic
  - Versatile, open system interfaces for rapid integration into multiple platforms
  - Compact 3U VPX form factor to fit into existing platform spaces
- Tri-Services mandate compliance
  - Sustainable solutions that remain superior through easy tech refreshes and software updates
  - Access to the latest commercially developed processing technologies for performance
  - Quick reaction capability by leveraging pre-engineered interoperable system build blocks that met a compressed schedule



Anatomy of a Modular Open System Architecture: DAEDALUS Receiver