Challenge
A leading developer of unmanned air systems (UAS) required a rugged mission management computer for an optionally piloted airborne platform’s mission system architecture which featured capabilities for simultaneous real-time data collection from multiple intelligence, surveillance, reconnaissance (ISR) and communications sensor payloads. The integrator for this advanced intelligence gathering air system sought a robust processor subsystem to interface with the various on-board payloads and mission subsystems, including EO/IR and SIGINT sensors, avionics and communications systems, Ethernet switches, situational awareness video cameras/encoders and network attached storage (NAS) devices. This device would interrogate the installed sensors and automatically configure the on-board software to manage the payload (sensors) without human intervention. The platform integrator was especially sensitive to size, weight and power (SWaP) considerations and specified high performance computing requirements. This translated into the mission management computer Line Replaceable Unit (LRU) needing to support the latest multi-core Intel® Core™ i7 processing capabilities together with a high number of interfaces to the many payload, video, network and I/O devices that would be required for various potential manned or unmanned system configurations.

Solution
• Modified COTS tactical mission processor tailored with COTS Mini-PCIe and PCIe104 I/O expansion cards
• Pre-integrated AMD GPU, multi-port Ethernet NIC, digital I/O, and MIL-STD-1553/ARINC429 databus interfaces
• Application engineering services to deliver turn-key customized system

Results
• UAS mission system architecture consolidates video and I/O functionality, eliminating separate laptops
• SWaP-optimized, cost-competitive mission processor pre-integrated with COTS I/O modules
• Mission software auto-configurable without human intervention for ISR payloads

CASE STUDY
Graphics/Payload Mission Management Processor for ISR Aircraft
**Solution**

The rugged, compact and modular design of the Parvus® DuraCOR® 8041 mission computer system made it an ideal solution for this ISR aircraft mission system architecture. The unit’s Intel (“Haswell”) Core i7-based quad-core 4th gen processor provided the level of performance that the customer sought, and the open architecture modularity enabled the relevant I/O, video, and network modules to be pre-integrated at the factory for a turnkey solution. Taking advantage of Curtiss-Wright’s cost competitive and quick-turn application engineering services, a modified COTS (MCOTS) variant of the subsystem was successfully and affordably integrated using rugged off-the-shelf mini-PCIe and PCIe104 modules. This included dual-redundant MIL-STD-1553 and ARINC 429 databases interfaces, multiple GbE network interfaces (NICs), and opto-isolated digital input/outputs. In addition, the system was equipped with a powerful AMD Radeon Graphics Processor Unit (GPU) card with 3D graphics engine support for Microsoft® DirectX® 11 and 576 GFLOPs of peak single precision floating point performance. This added three additional high definition video interfaces to the system (total of 6) and the ability to optionally perform general-purpose GPU (GPGPU) parallel computing. This integrated GPU functionality also helped to consolidate aircraft LRUs, eliminating the need for a separate laptop computer for the pilot to view moving map information, since this could now be done through the mission management processor LRU. A 1-slot removable 2.5” solid state disk add-on segment, capable of hosting high-capacity solid state media, was also integrated to support removable mission data storage requirements.

**Results**

The customer can now deploy a highly integrated ISR mission processor subsystem tailored to the needs of this advanced ISR aircraft’s mission system architecture. The modified COTS (MCOTS) variant of the DuraCOR 8041 includes all required I/O and network interfaces in a single LRU device that minimized SWaP as well as recurring and non-recurring costs. Thanks to the modularity of the subsystem architecture, the processor integrates a high number of network, video, serial, avionics, and other digital inputs/outputs tailored to support the various manned or unmanned ISR mission requirements of the platform. Leveraging this robust solution, the customer can now realize the platform’s full potential, interfacing with installed sensors and auto-configuring mission software to manage the payload sensors.