AWACS Network Upgrade using Modified COTS Helps Shorten Delivery

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Upgrade of sophisticated on-board network
- Harsh environmental conditions
- Tight development schedule

Solution

- Modified commercial off the shelf (MCOTS)
- Small form factor (SFF) modular architecture
- Line replaceable units (LRUs)

Results

- MCOTS systems saved time and money
- Customer happy with program management
- Units supplied for delta qualification testing

Challenge

For the majority of operational airborne early warning and control aircraft (AEW&C) over 20 years old, on-board radar and networking systems are based on outdated technology that need to be upgraded to be effective in today's airborne defense engagements. When one such aircraft fleet was undergoing an upgrade of the on-board AEW&C network, they contacted Curtiss-Wright to find a cost effective yet rugged, quick turnaround solution for multiple processing and communications subsystems.

To withstand the harsh environmental conditions on-board the fixed wing aircraft, the equipment needed to meet DO-160 environmental, EMI, and power hold-up requirements. Electronics also had to be export controlled as commercial items and be available in time to meet the customer's tight integration schedule. Additionally, they needed to ensure that the processor architectures used could handle single-event upsets (from space radiation) by incorporating Error Correcting Code (ECC) memory and non-volatile removable Flash disks (to support sanitize procedures). Due to the sensitive nature of the data the system would handle, the integrator was interested in Intel®-based solutions coupled with secure Cisco® routing technology that had gone through FIPS 140 and Common Criteria evaluations, as provided by the Cisco 5915 Embedded Services Router.

To keep program risk, costs and total system footprint down, the customer's network architecture upgrade included four Small Form Factor (SFF) systems from Curtiss-Wright, ten in total on each aircraft, with redundancies included.

Solution

Wanting to move to the latest generation of Commercial Off-The-Shelf (COTS) mission subsystem technology Curtiss-Wright has to offer, the customer was able to modify COTS (MCOTS) to minimize non-recurring engineering (NRE) expense, while minimizing program and schedule risk. The extensive qualification test program by Curtiss-Wright on its COTS systems also helped this customer to reduce testing costs and focus on primarily delta qual testing specific to the platform.

The below outlines how off-the-shelf systems were modified to fulfill the customer's requirements.

Results

Choosing COTS based solutions for this program enabled the customer to keep NRE costs down while still creating tailored solutions to fulfill their unique requirements. Early access units were delivered prior to the initial production grade units, so that additional qualification testing could be completed and systems could be integrated into the labs supporting the program. The quick availability of the MCOTS systems and Curtiss-Wright's program management team enabled them to meet the aggressive program development schedule. Following the completion of the customer's delta qualification testing, additional production units will be delivered for integration onto the aircraft fleet in 2019.

Cross domain server based off DuraCOR 8043 mission processor

- Isolated Ethernet interface cards supporting the processor to host trusted thin client and cross-domain high assurance guard software

- Two-slot removable Solid State Disk (SSD) segment to support cyber security needs

- Add-on segment for DO-160 200 ms power hold-up

Voice gateway system based off DuraCOR 8043 mission processor

- Add-on radio over IP (RoIP) router cards provided voice over IP (VoIP) gateway phone service

- DO-160 power hold-up capacitance for 200 ms enabling power transfer between airports and onboard power without power re-set

Server Router Switch based off DuraWORX 8043 computer + router + switch

- Combination of 6th gen Intel® Xeon® processor with Cisco 5915 router and Microsemi-based Gigabit Ethernet (GbE) switch to serve as a server-router-switch (SRS) LRU

- Add-on segment for DO-160 200 ms power hold-up

Standalone, off the shelf, DuraNET 20-10 switch box

- 20-port GbE SFF fully managed Switch