CASE STUDY

Modernization of a Ground Vehicle Network System Using Miniature Switch and Router LRUs

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Integrator needed to upgrade networking hardware for ground combat vehicle
- Rugged electronics had to be COTS-based and SFF
- Network routing required Cisco® Systems IOS-XE® technology

Solution

- Rugged COTS systems qualified for military and aerospace
- Integration of ultra-small Ethernet switch and router LRUs
- Familiar interface and robust Cisco IOS-XE security capabilities

Results

- Built on integrator's investment in Cisco IOS infrastructure and training
- Met demanding size constraints and environmental conditions
- Provided Gigabit throughput for secure communications

Challenge

A military systems integrator received a government contract to upgrade the computer networking electronics onboard a small fleet of ground combat vehicles as part of a modernization pilot program. If successful, the contract would demonstrate increased network capacity, resiliency, and convergence for the warfighter over previous tactical on-the-move network architectures.

Leveraging its familiarity with Cisco Systems technology, the integrator initially prototyped with semi-rugged/industrial Cisco routers and switches in its systems integration lab (SIL). But for the harsh environments of combat and tactical vehicles, the integrator ultimately required full MIL-STD rugged networking solutions that minimized the size, weight, and power (SWaP) impact to the vehicle.

Similar to many other government upgrade efforts, this integrator was encouraged to select rugged commercial off-the-shelf (COTS) hardware. This equipment should be not only suitable for the harsh operational environment of the platform, but also meet federal cybersecurity requirements for handling sensitive network traffic. For this reason, the integrator strongly preferred a Cisco IOS-based solution, given Cisco's leadership in network security and its familiar software interface. Critical to the pilot program's success was delivery of all required electronics to the integrator in time for upgrading vehicles to meet government testing milestones.

Parvus DuraNET 20-11

Parvus DuraMAR 6300

Solution

Building on previous program successes integrating rugged network switches and routers from Curtiss-Wright into other warfighter networks, the integrator turned to Curtiss-Wright's Parvus® line of small form factor (SFF) network line replaceable units (LRUs). As a Cisco solution technology integrator (STI) partner, Curtiss-Wright regularly integrates the latest embedded routing and switching technologies into rugged COTS embedded systems, which are validated to demanding military and aerospace vehicle and aircraft standards. In fact, Parvus DuraMAR® router and DuraNET® switches undergo very comprehensive environmental, EMC, and power compliance testing, spanning numerous MIL-STD-810, MIL-STD-461, MIL-STD-704, MIL-STD-1275, and RTCA/DO-160 requirements.

The integrator selected the ultra-small form factor (USFF) Parvus DuraMAR 6300 secure router, which integrates Cisco's ESR-6300 embedded router card and IOS-XE software in a rugged chassis with circular military-grade connectors and power supply. This enabled advanced security for data-in-motion of Layer 3 Wide Area Network (WAN) traffic. The miniature network router features Commercial National Security Algorithm Suite (CNSA) Next-Gen Encryption algorithms (formerly known as NSA Suite B), virtual private network (VPN), firewall, and secure boot. It is thus well suited to protect SWaP-constrained military and civil vehicle networks, including those with Red-Black architectures.

Its integrated Cisco ESR-6300 card is expected to soon complete its Common Criteria evaluation with the National Information Assurance Partnership (NIAP) and become an approved Commercial Systems for Classified (CSfC) component, like its predecessor the ESR-5915. To enable radio aware routing (RAR) and mobile ad hoc networking (MANET), the integrator selected the Cisco IOS-XE Network Advantage software package for the system.

To complement the DuraMAR 6300 router with more LAN port density, the integrator also selected the USFF Gigabit (GbE) DuraNET 20-11 switch, which is small enough to fit in the palm of your hand and features a carrier-grade Cisco-like management interface. With its miniature size, the 20-11 enables network connectivity in some of the most SWaP-constrained environments on the vehicle platform. Both of these devices underwent extensive MIL-STD and DO-160 environmental and EMI testing to extreme temperature, vibration, shock, humidity, fluid ingress, and EMC conditions, pre-qualifying them for use on combat ground vehicles.

Results

By selecting the most rugged COTS network routers and switches available for this ground vehicle upgrade, the integrator reduced the pilot program's risk and cost for systems integration. At no cost to the integrator, Curtiss-Wright accelerated development and production of the new DuraMAR 6300 LRU to meet the vehicle integration schedule. This has enabled the government end user and the integrator to take advantage of this new rugged and secure embedded networking technology to provide Gigabit Ethernet throughput for secure WAN/LAN network backbone communications.

Since the units were delivered in time to support the integrator's schedule, the customer is now considering potential integration of other Curtiss-Wright products. Pending successful completion of the pilot, the government service may roll out Curtiss-Wright's rugged networking technologies across more vehicles. Curtiss-Wright's support of the pilot program and development of rugged Cisco-based solutions that are pre-certified for military deployment has well positioned the integrator for potential future contracts.