

AEROSPACE & DEFENSE REVIEW

aerospacedefensereview.com

ISSN 2691-395X

**AVIATION
EDITION**



Alta Data Technologies



The annual listing of 10 companies that are at the forefront of providing Aviation solutions and transforming businesses

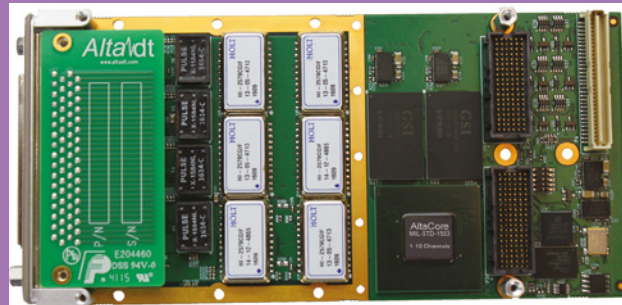
Alta Data Technologies

Advancing Aircraft Readiness

Alta Data Technologies LLC (Alta) is well-recognized in the aerospace industry for its MIL-STD-1553 and ARINC COTS communications solutions.

The MIL-STD-1553 Ethernet converter drastically reduces data loading time.

One of the harshest environments for any electronics packaging is aircraft flight line maintenance. Not only does the packaging have to be rugged, but it must also take into account special platform cabling requirements. Everything from jet fuel spills, voltage transients, and sudden cable disconnects (break-away) to EMI interference must be taken into account.



Recently, Alta was able to help Lockheed Martin (LMCO) meet the challenges for MIL-STD-1553 data loaders (aircraft computer reprogramming) on a premier aircraft fleet. Alta demonstrated the use of their real-time 1553 to Ethernet converter, ENET—a candy bar-sized COTS appliance, to drastically reduce programming times compared to their current 1553-USB device (from another vendor).

USB is a good interface for non-real-time data packets used in consumer products and slow test functions, but USB has very high inter-packet latency compared to Ethernet, especially for small packets found on 1553 avionics networks.

The Alta ENET product, which has been deployed on thousands of aircraft, demonstrated a marked improvement in 1553 data loading times, reducing flight line reprogramming time by hours. This is uniquely possible with Alta's proprietary FPGA Ethernet and 1553 real-time interfaces that maximize the

throughput of the two network pipes. The tactical advantage of Alta's ENET technology could not be understated as mission data load times were drastically reduced, directly resulting in increased aircraft readiness.

However, moving from demonstration to mass deployment can always be a tricky maneuver. The ENET product is an aluminum brick with side (90 degrees to the package) circular connectors, which would be clumsy for flight line connections (it works great for being mounted in the airframe but is not ideal for mobile aircrew applications). Fortunately, Alta was already in the design of an ENET daughter product that had the electronics built directly into the cable assembly. Alta worked with LMCO to address special environmental and cabling requirements, which were minor adjustments to Alta's general market COTS product.



The in-line (NLINE) product was a culmination of years of experience of Alta engineers.

Jake Haddock, CTO of Alta Data Technologies, says, "We had always been eyeing an NLINE-type product, even when we first made the ENET concept more than ten years ago. The ENET is still a robust product with a real-time, FPGA Ethernet design in front of our 1553 protocol engine, AltaCore. Our



design handshakes Ethernet packets in less than 10-20 uSec, which is usually much faster than even RTOS operating systems. So, the ENET is not the lagging device in the Ethernet connection."

But a single mechanical package cannot satisfy all avionics application requirements. For the NLINE product line, Alta finally settled on an over-molding technology that would encapsulate the ENET electronics directly 180 degrees in the cable as a rugged 'bump.' The company experimented with various packaging techniques and different plastics and ended up with multi-step over molding process that includes advanced grounding techniques for EMC protection.

The learning curve and capital investment were significant, but Alta was very happy with its final COTS product, which passes full MIL-810 shake-n-bake, MIL-461 EMC, 60,000 ft altitude, and even fully operational water immersion. Alta invested in bringing the over-molding capability in-house so it could quickly turn variations of the product to match program requirements, which are always different for each platform. Now the company can fast-turn semi-custom requirements like 38999 and break-away connectors, different pin-outs, or cable lengths.

Alta has expanded its NLINE product family to offer USB and PCI Express Thunderbolt interfaces. The NLINE-T1553 Thunderbolt product is really interesting as the product offers PCI Express performance with hardware interrupts in a rugged in-line cable. This can directly replace interface cards in a computer system while still utilizing the same software found in more complex applications.

Not only has Alta's ENET product drastically improved flight line 1553 data loading performance, but their early delivery of the first lot production and proven quality means that aircraft readiness will be further improved. Alta has had a remarkable more than ten-year running track record of 100 percent on-time deliveries, even despite the COVID supply chain disruptions, and a remarkably low warranty failure rate of <0.0036 (all results ISO audited). Most of Alta's orders are low-quantity run-rate, where products ship in only

one to four weeks, and Alta can accommodate program scheduled orders to help maintain just-in-time production for customers.

Richard Schuh, CEO of Alta, says, "Maintaining our on-time delivery record and quality product metrics have always been twin priorities of the company. We are very fortunate to have vendors that are true partners in our business where they have an equal priority to us as customers."

The COVID supply chain disruption, which now seems like standard industry practice, required us to stock up inventory while sacrificing cash flow, but Alta's priority to customers is to maintain quick, high-quality deliveries. This strategy has been a win-win for the bottom line as it was able to grab market share when others dropped the ball.

"From the start of the company, we planned to have the best-manufactured and tested products. We are one of the few vendors that implement multiple full boundary scan JTAG tests and IPC-610 Class 3 inspections, the highest commercial level, along with full-function testing and image scanning for quality verification. We offer the best warranty in the business, and even through our rapid growth, we've had so few product failures that our financial GAAP audits show warranty costs as immaterial. We like that," says Schuh.

Next-generation Alta 1553-Ethernet products will include IEEE.801ae MACsec support. This will provide full point-point (data in motion) AES256 encryption of the Ethernet host packets. In addition, Alta has released two new mini mezzanine boards (about the size of a couple of quarters) with Ethernet host backplanes: The MEZ-E1553, which is a dual-channel 1553 interface, and the MEZ-EBR, which is an AS5652 Enhanced Bit Rate (EBR) 10Mbit RS-485 1553 interface. These MEZ packages include complete development reference designs to allow the customer to quickly embed Alta's industry-leading AltaCore protocol engines directly into their design. All products include the AltaAPI SDK, which provides seamless code portability between products and a five-year limited warranty. **AD**