

Alta Data Technologies

Revolutionizing Avionics: Leading the Charge in Ethernet-Centric Solutions

The Avionics Landscape: A Shift Towards Ethernet Converters for Legacy I/O

Modern avionics systems are increasingly dominated by Switched Ethernet, a testament to its flexibility and performance. However, this shift presents a significant challenge: seamlessly integrating vital legacy communication standards—such as MIL-STD-1553 (1553), ARINC 429, and discrete I/O—that remain critical for operations like radio, flight controls and stores management.

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A flexible and cost-effective approach has taken hold: directly connecting these legacy I/O sources to the Ethernet network via small, portable data converters or collectors. This “appliance” or “brick” approach effectively transforms the Ethernet network into a pseudo-backplane, utilizing small, rugged bridge devices or in-line cable assemblies. The benefits include near-limitless software portability, simplified hardware configurations, reduced power consumption, and simplified wiring.

Alta Data Technologies: Pioneering Networked I/O Solutions

At the forefront of this evolution is Alta Data Technologies (Alta). Recognizing the transformative potential of networked I/O over 10 years ago, Alta pioneered the concept of real-time 1553 & ARINC converters with their groundbreaking ENET-1553™ product. The ENET is a real-time avionics Ethernet converter that seamlessly bridges legacy 1553 systems in a rugged package about the size of a candy bar.

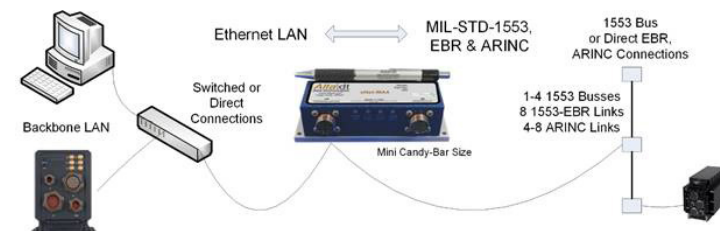


Figure 1: Simplified Concept of Avionics Ethernet LAN with Real-Time I/O Converter ENET-1553

Alta’s design ingeniously utilizes a thin-server, real-time IP/UDP protocol engine as its “backplane,” which allows memory at speeds approaching traditional PCIe backplanes. The thin-server methodology is a game-changer, significantly shortening round-trip transmission times by optimizing IP/UDP stack processing.

Introducing the NLINE™ Series: The Pinnacle of Rugged Reliability

Building on years of experience and market feedback, Alta engineers developed the NLINE™ product line—an even more ruggedized derivative of the ENET concept. As Jake Haddock, CTO of Alta, explains, “The ENET distinguishes itself with a real-time, FPGA Ethernet IP processing engine in front of our 1553 or ARINC protocol engines. Ethernet IP packets are

turned around in less than 10-20 μSec, which is usually much faster than even RTOS IP stacks can process packets at 1G—so our product is not the diminishing variable in the connections path delay.”

However, Alta recognized that a single package couldn’t meet all deployment needs. Haddock elaborates on the NLINE’s development: “For the NLINE product line, we finally settled on a packaging technology that would over-mold the ENET electronics with multiple molding layers, including a copper sheeting layer for EMC requirements. Our NLINE 1553 product passes MIL-810G shock & vibration, MIL-461 EMC, 60,000 ft altitude, and even full operational water immersion, and is available with standard or 38999 connectors.”



Figure 2: Alta’s NLINE Small, Rugged 1553-Ethernet Converter

The NLINE product line further enhances flexibility by offering USB or Thunderbolt™ host interfaces in addition to Ethernet, supporting the same software from lab to deployment.

Alta’s ENET-1553 & NLINE: Robust, Versatile, and Field-Proven Solutions

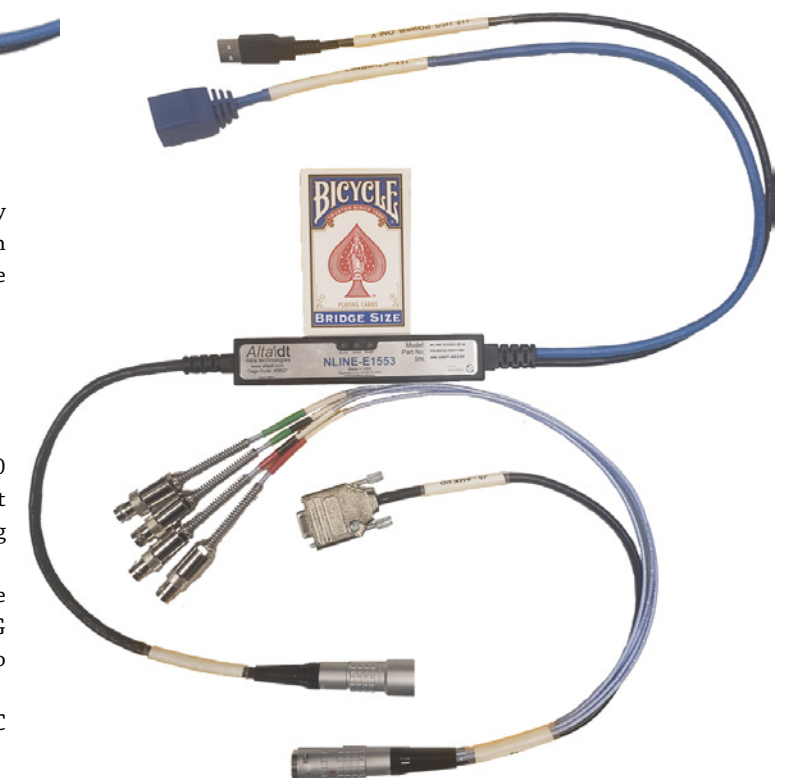
Alta’s ENET and NLINE products offer standard 5-30 Vdc, MIL-704 raw aircraft or Power Over Ethernet (POE) powering options. The latter reduces cabling requirements. In addition, all products offer:

- **Automatic Data Bridge Mode:** Provides real-time Ethernet conversion of 1553 or ARINC data with IRIG or PTP time stamping. Allows select packets of data to be shared between networks.
- **Signal Capture:** Capture the raw 1553 or ARINC signals for integrity analysis.
- **Automatic Image Loading:** Simplifies 1553 setup with fast start-to-ready times.

Alta products are ideal for a vast range of 1553 BC, RT and BM simultaneous system applications, including store management, power controls, maintenance data logging, and data loaders (memory loaders). Crucially, its IP/UDP socket communication is natively supported by virtually every OS, ensuring unparalleled software portability and allowing processing computers to be upgraded independently of the I/O interface.

Alta: The Supplier of Choice for Modern Avionics

With thousands of units deployed on C-130s, Blackhawk Helicopters, and drones worldwide, Alta’s ENET and NLINE products are field-proven and trusted. Rigorously tested to various MIL and DO standards, these solutions are part of a broad portfolio, including PCI Express, PMC and XMC interface cards and USB/Thunderbolt appliances. Most products, including extended temperature variants, are off-the-shelf in 2-4 weeks and include an industry-leading five-year warranty. [AD](#)



Snapshot image for cover: Alta NLINE Ethernet-1553 Cable

