

# SMART CABLES FOR AVIONICS

USB interfaces with built-in hardware, firmware and processing resources combined with off-the-shelf computing power offer game-changing solutions for testing avionics data

With more electronic avionics equipment being integrated into almost any type of aircraft (fixed and rotary wing), demand exists for portable test equipment for on-aircraft testing and troubleshooting. Dedicated handheld devices displaying avionics bus data in basic formats such as simple binary or hex view have been around for many years. In today's situation, we have a game changer, with the availability of more powerful portable platforms such as tablets and smartpads offering new capabilities and endless possibilities for portable test equipment implementations from both the technical and the commercial point of view.

A wide range of portable computing platforms are available as commercial-off-the-shelf (COTS) devices that theoretically can cover almost every avionics testing application, from the laboratory environment up to rugged use in the hangar, or even for on-aircraft testing.

Testing avionics databuses and networks, which typically interface to data communication standards like ARINC429 and MIL-STD1553, are not readily supported off the shelf by such computing platforms.

Common data connection interfaces for most of these computing platforms is Ethernet (wired or wireless implementations) and USB. Wireless Ethernet is attractive from a user handling perspective, primarily because it requires no cabling for communication between the computing platform and the interface for the tested device. However, the interface device still needs to be powered, raising a further issue as to how to provide power for the application or user case. For larger avionics testing solutions, Ethernet is definitely a good choice. It handles the concern of computing platform obsolescence by keeping the Ethernet-based avionics interface hardware investments in place and only replacing the computing platform.

On a smaller scale, by using highly portable testing solutions, a common off-the-shelf USB interface on COTS platforms is a good candidate worth examining more closely.

USB interfaces can deliver power so the interface hardware can be connected via a single cable for powering and controlling the data interface. Additionally, USB is an established standard and has been in use for

many years. Even today, we see the USB interface being updated and migrated to the newer COTS portable computing platforms.

Obsolescence handling of platforms is made easier by more dedicated avionics databus interface hardware being USB based. Both USB 2.0 and the higher data-rate USB 3.0 are typically implemented in such platforms with the advantage of having maximum flexibility for the user and application.

From a data rate perspective, USB 2.0 is still suitable to handle the ARINC429 and MIL-STD-1553 standards. It also has lower power requirements for its interface hardware, the benefit being a saving of valuable battery power of the hosting platform, providing longer operational time without requiring an external power supply or a battery recharge.

The AIM SmartCable family (ASC429 and ASC1553) has been designed to offer USB-based interface solutions to operate on any single USB 2.0 (or higher) port. This provides maximum flexibility for the connection, especially for portable computing platforms. A low-power hardware design has driven the current solution for a half-pocket sized interface (75mm wide, 55mm long, 15mm high) for ARINC429 and MIL-STD1553 test, simulation and monitoring applications.

Any concerns with respect to handling avionics databus protocol-related real-time capabilities over the USB interface are dealt with by having the required hardware, firmware and processing resources directly integrated within the D-sub connector housing. Additional potential is also offered with the use of a dual processor System-On-Chip device (SOC).

Working with COTS computing platforms, offering USB 2.0 capability as a minimum, a solution for interfacing avionics databuses now offers the capability for a full bus analyzer, troubleshooting and data loading capabilities with minimum size and weight.

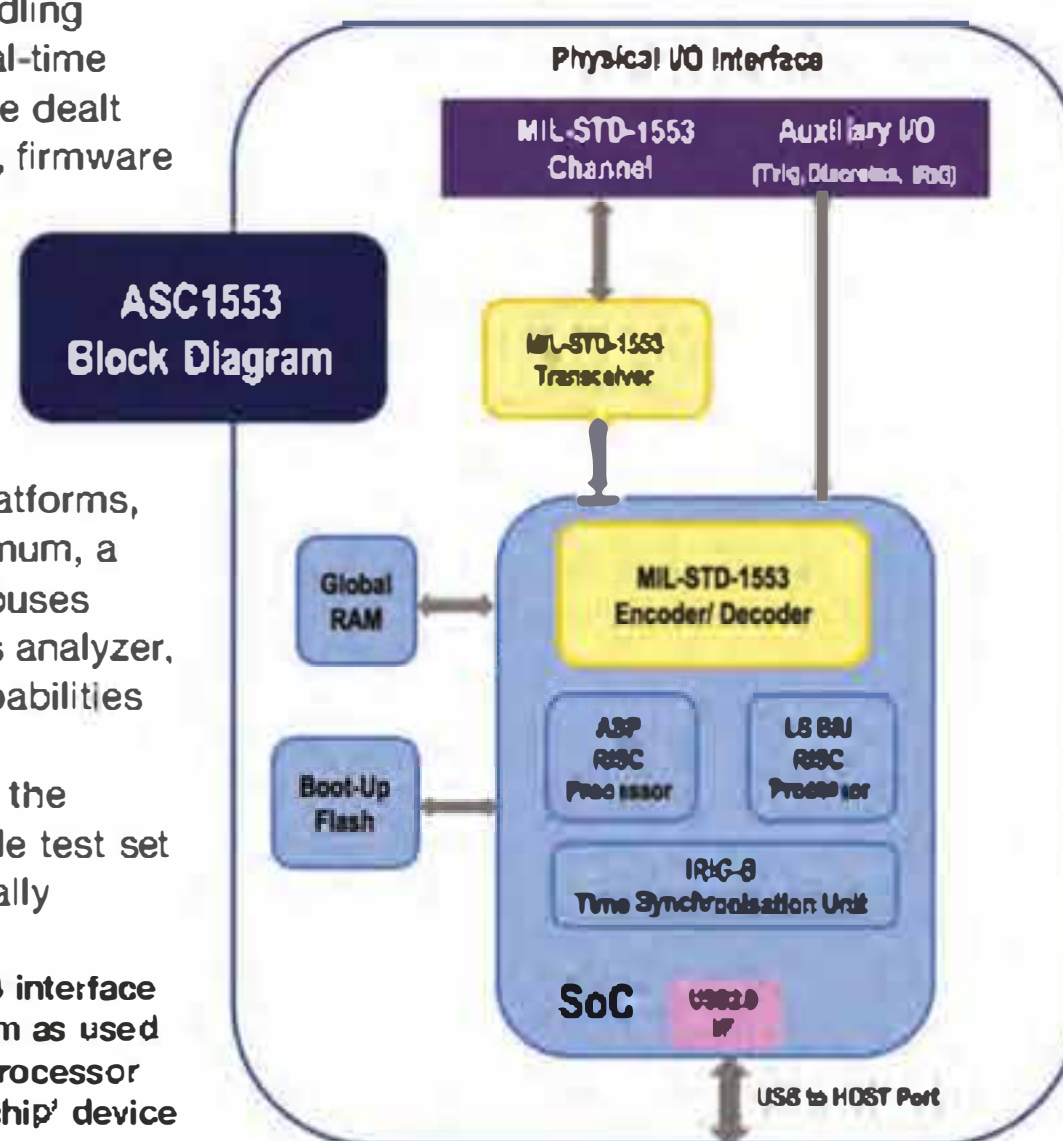
With flexible application software, the essential building blocks for a portable test set are now available and can be principally



The AIM SmartCable has USB 2.0 with a D-sub connector which integrates hardware, firmware and processing resources

implemented using COTS hardware and software. Customization of software and hardware can address dedicated user cases as well as differing operator skill levels. At the hardware level, the typical 'A-Type' USB connector can be easily replaced with a more robust circular connector, which can mate with corresponding tablet computing platforms. On the software side, the COTS software customization capabilities, such as the implementation of application-specific Graphical User Interfaces (GUIs), allows flexible adaptation to the end user's needs and applications.

AIM supplies COTS hardware and software solutions for avionics databus, network interfacing, testing, simulation and data loading. It offers such building blocks in the form of the ASC429 and ASC1553 AIM SmartCables together with the PBA.pro software and suitable third-party computing platforms to provide smart and highly portable testing solutions. ■



The ASC1553 interface block diagram as used by the dual processor 'system-on-chip' device in the connector

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