Welcome to the autumn edition of AIMView Newsletter!

Introduction

You may have noticed that we have updated the look and feel of AIMView which we trust better services our readers. We hope you will find this issue both interesting and inspiring.

We have extended our family of generic carrier cards which now host PMC and XMC avionics interface cards, ready for installation into PCIe based host computing platforms. For VME users we also have re-designed our commercial grade PMC generic carrier card for that of conduction cooled, embedded applications.

The Industry standard PBA.pro™ Databus Test & Analysis Tool, continues to be the software of choice for users needing a tool for basic databus test and analysis, right through to a complete avionics test bench. Some new PBA.pro™ features for our Fibre Channel and AFDX/ARINC664P7 user community are now available with the latest release.

Yet another first from AIM, is the ability to embed the PBA.pro™ (Linux based) directly into our growing family of ANET (Ethernet based) test and simulation boxes.

VME based Conduction Cooled Carrier Card for Embedded applications by Berthold Schweitzer

VME Cooled Carrier Cards!

Leveraging from AIM’s field proven AVC-2 VME-Carrier Card for VME systems, we are pleased to announce a new conduction cooled variant designed in accordance with the IEEE 1101.2-1992 (2001) specification for conduction cooled environments. Commercially known as the AVC-2-CC, it is a single slot, double height (6U) with 0.8 pitch, VME64x, extended VMEbus module with two separate PMC slots fully compliant with the ANSI/VITA 20-2001(R2005).

Interface signalling of the two PMC-sites are available at the P0 and P2 connectors. The Conduction Cooling Assembly (CCA) includes Wedge Lock retainers, card ejectors and is designed to dissipate the heat from the hosted Mezzanine Cards to the surrounding chassis for cooling. The CCA is constructed out of a whole aluminium plate, the surface of which is black anodized. The module is specifically designed for harsh environments having an extended temperature range from -40°…+85°C. As a priced option, conformal coating is also available.

The AVC-2-CC has been designed fully Software compatible to the standard AVC-2 variant. No integration effort is required for customer application software already developed for the standard card. Used in conjunction with AIM’s latest design AMCX1553-n-CC, AMCX429-n-CC and AMC-FDX-2-ES (conduction cooled versions) it is the ideal solution for embedded applications.

A VxWorks driver library is available to cover any mix of AIM conduction cooled interface modules. This generic VxWorks driver library is included in the module price. Essentially any 3rd party conduction cooled module which is compliant to the PMC slot standard maybe used on the AVC-2-CC.

Yours truly Douglas Ullah
Director of Sales & Marketing

In this issue:

- VME based ‘Conduction Cooled’ Carrier Cards support Embedded Applications
- New PMC/ XMC Carrier Cards now available for PCI Express
- Intelligent Handling IP-Datagram Reassembly for AFDX/ARINC664P7 and Industrial Ethernet
- AIM’s Fibre Channel Modules now support the FC-0C-AS upper layer protocol!
- PBA.pro-LIGHT for AFDX/ ARINC664P7 - a new shining star
- Flexible Ethernet-enabled Avionics Bus Interfaces and Analysers using AIM’s ANET products

...also in the News

Our Russian Partners!
AIM supported our partners EMT Trading in Moscow at this year’s Aerospace Testing - October 2013.

AIM’s New ARINC818 Website!
For a brief overview of the latest standard for Digital Video for Avionics applications visit www.arinc818.info

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www.aim-online.com
Joining our family of generic carrier cards AIM has just introduced two new Mezzanine Carrier boards for PCI-Express. Both are Short Length, Single Lane PCI-Express modules having one PMC or XMC slot. The ACPe-1 can be configured with any AIM PMC card for MIL-STD-1553, ARINC429, AFDX/ ARINC664P7, ARINC825 or in fact any Third Party PMC module. The carrier board implements a PCIe-to-PCI bridge, designed to plug all standard PMC modules.

The secondary PCIe bus is implemented with 32-bit/ up to 66MHz, configured to support either +3.3V or 5V signalling voltages.

Our ACPx-1 can be configured with any AIM XMC card for MIL-STD-1553, ARINC429 or again Third Party, Vita 42.3 compliant XMC module. The Carrier board implements a PCIe-to-PCIe bridge, designed to plug in all standard XMC modules. The secondary PCIe bus is implemented as a Single Lane PCI Express Bus supporting bus operations up to 5Gbit/s.

The latest PBA.pro™ for Windows and Linux are now available to support IP-Datagram Reassembly for received data using the powerful Chronological Bus Monitor.

The background for this, is that when transmitting AFDX/ ARINC664P7 and Ethernet messages larger than the maximum transmission units (MTU - 1518Bytes for Standard Ethernet), they will be sent in a set of smaller packets, representing the fragments of a message.

On the receiving side, these packets are reassembled into complete messages based on the IP-Header Information controlling the fragmentation on the transmitter side.

A single option was to have complete reassembled messages within PBA.pro™ using the AFDX Sampling or Queuing Ports, but using this approach, the complete address information including the Virtual Link ID, IP Source/ Destination Address, UDP Source and Destination Port, needed to be known in advance to configure the receiver.

A further receive mode, captures only single packets in chronological order (we call it the Chronological Bus Monitor). This is the exclusive receiving mode for our AFDX/ ARINC664P7/ Ethernet modules operating in standard Ethernet mode within the PBA.pro™ Software.

To date, the Standard Ethernet mode of the PBA.pro™ had no reassembly functions in conjunction with the AIM AFDX/ ARINC664P7 Ethernet modules. With the introduction of PBA.pro™ Version 2.51 the AFDX- and Ethernet Component supports IP-Datagram-Reassembly on the receive side and also for the Chronological Bus Monitor. All incoming packets are analysed and placed into a second reassembled message stream on-the-fly. This takes place in real time to capture and display active chronological monitoring of the incoming packets.

The immediate availability of the reassembled messages allows online Parameter decoding and viewing at any position of a reassembled message. For analysis purposes, the complete payload is available in one piece, with the original packet transmission sequence still accessible.

To get your copy of PBA.pro V2.51, please visit our website and enter the download area.
The PBA.pro-LIGHT-AFDX can also be easily upgraded to a PBA.pro full version any time. Users already having a full version of the PBA.pro-AFDX-2 component can simply download the AFDX-LIGHT package which contains the displays (created by the PBA.pro Designer Component) and the related user documentation free of charge! The package is located in the PBA.pro Accessories section of the AIM download area, accessible from our website www.aim-online.com.

With the successful introduction of the PBA.pro-LIGHT for MIL-STD-1553 and ARINC429, the next step was for AIM to introduce a lightweight version for AFDX/ ARINC664P7 users. Available for immediate delivery is the PBA.pro-LIGHT-AFDX. It has been derived from the powerful PBA.pro-AFDX resource component, but simplified for novice users without compromising the user interface with an easy to use simple interface.

No past knowledge of the underlying AFDX/ ARINC664P7 bus protocols is required to take full advantage out of the box. Key features include:

- Send generic frames with individual content where almost every byte can be modified
- Receive frames within the Chronological Bus Monitor
- Send and Receive Messages in Sampling and/ or Queuing Mode
- Display the current bus activity and the general status of the AFDX board

The PBA.pro-LIGHT-AFDX can also be easily upgraded to a PBA.pro full version any time. Users already having a full version of the PBA.pro-AFDX-2 component can simply download the AFDX-LIGHT package which contains the displays (created by the PBA.pro Designer Component) and the related user documentation free of charge! The package is located in the PBA.pro Accessories section of the AIM download area, accessible from our website www.aim-online.com.

Another bright light – PBA.pro-LIGHT-AFDX

by Andreas Hagmüller

AIM continues to extend the feature list of our powerful Fibre Channel products. For example the Anonymous Subscriber Message (ASM) protocol for Fibre Channel (FC-AE-ASM) has been defined to offer deterministic, secure, low-latency and low overhead communication between the elements of mission-critical avionics systems.

An important design philosophy is that the protocol can be easily mapped to other physical transports. ASM limits the use of the vast amount of Fibre Channel features reduced down to a low number of essential functionality, which further reduces the implementation risks of adapting the FC-AE-ASM protocol to an existing system. A key application for such is connecting data sources, which might send large amounts of data to a receiving controller unit over a Fibre Channel network.

AIM has implemented the ASM protocol Analyser and Generator for supporting system integration and development. It features the well-known FC-2 Layer functionality, plus it offers capabilities to define ASM messages with a pre-defined repetition rate. Messages can be defined in cyclic or one shot (fully application driven) while the message payload can be changed on-the-fly. Multiple messages can be sent concurrently with different repetition rates. Larger messages will automatically be split across several Fibre Channel frames. On the receiver side, the receiver can automatically re-assemble any received ASM message. The receiver analyses the incoming messages for physical and logical errors for displaying this information together with a 10ns-resolution timestamp in the ASM message viewer.

PBA.pro™ application software is the most flexible tool for handling various data bus and network interface types. It offers many possibilities to set up the ASM message generator and analysing ASM messages. The ASM message viewer and the Chronological Monitor functions display the Fibre Channel FC-2 data together with the AIM Fibre Channel interface boards. Within the easy-to-use graphical interface, users are free to design their own panels and displays and to interpret the received ASM messages. With the use of the PBA.pro™ Test and Script Manager component users can develop powerful scripting facilities implementing full-functional test and simulation benches.

For more information as to how AIM Fibre Channel products can help you with your ASM needs, please contact your nearest AIM office or Representative.

www.aim-online.com/contact/contact9.aspx
AIM has recently introduced its ANET line of Ethernet-enabled, avionics bus interfaces and analyzers. In the past, our systems have been plugged directly into a host machine through any number of means: a resident PCI bus, a PXI chassis, a USB interface, etc. Though all of our devices have always had their own processor and memory, they required the presence of an external computer to handle control, message passing, and data storage.

With the release of the ANET line, this has changed. Our new architecture puts a full-fledged Linux computer right in the box. Though this does not eliminate the possibility of an external computer for control and storage, it does negate its necessity. Currently, the ANET supports several different modes of operation.

The first and most obvious mode is the ‘interface mode’, exactly like all of our other instruments. In fact, an ANET box can be put in to an existing AIM system with almost no modification to either PBA.pro™, or to your custom code. But since it is a Linux system, you can run an embedded version of PBA.pro™ (without the graphical user interface) right on the box. This version of PBA.pro™ can make use of your existing project files, scripts, and databases. Another option is writing your own code directly to the Linux kernel. The ANET contains a true Linux distribution and can support external instruments for serial communication (RS-422, etc.), USB drives for convenient data storage, and many others.

It is also fully possible to mix and match these various scenarios. As a case in point, we recently came across a real-world application that was in need of an ARINC-429 analyzer that also has RS-422 and ARINC-717 capabilities. Additional requirements included the use of WiFi dongles for wireless access to a network, autonomous operation such that the system starts running on power-up and configuration and control via one or more remote computers. By combining the capabilities of the Linux operating system and its driver support, the ARINC429 analyzer and simulator and third-party devices combined with embedded PBA.pro™, we were able to provide a very compact but powerful turnkey solution.

In this case, we started with PBA.pro™. Our analyzer software makes it easy to prototype this system on a desktop machine. You can set up an ARINC-429 project file within PBA.pro™ and then move that project file, as well as its associated scripts and databases, to the ANET when you have it set up the way you want. Additionally, since the ANET runs a standard kernel and distribution, there is very little that needs to be done in order to connect third-party instruments. Their drivers can be easily ported to the ANET’s operating environment.

Finally, remote control of the system is simple. The copy of PBA.pro™ embedded within the ANET device can send and receive commands via Ethernet. Configuration can be done by opening a web browser, telnet, or SSH session directly to the ANET.

The ‘all-at-once’ option gives a very high degree of flexibility and power without sacrificing any of the strengths of the system. The embedded copy of PBA.pro™ is used to do what it does best: communicate with the avionics bus. The Ethernet connection is used for configuration and communication with external systems. And finally, the Linux kernel is used to manage data storage and handle any specialized needs for data acquisition and control. The ANET device has ample power and storage capacity to handle even the most specialized needs.

Figure 1: ANET device control scenarios

**Scenario 1:** Using the ANET as a traditional Instrument

**Scenario 2:** Using the ANET as a stand-alone Instrument

**Scenario 3:** Using the ANET as a data server or client

**Scenario 4:** Wiring directly to the the Linux kernel

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