MilCAN matters

The deterministic protocol for CAN

Issue 8 **1 June 2008**

26th MilCAN Meeting @ Ultra EE

The 26th MilCAN meeting was hosted by Ultra Electronics located at Cheltenham, Gloucestershire. Such was the attendance that there was standing room only! Once sufficient chairs had been found the meeting started off with a number of outstanding actions from the last meeting, most companies represented had struggled to complete actions due to a very busy period since the last meeting. The actions were revisited and aligned with current requirements.

The Chairman lead the discussion on the easy of use of the MilCAN specifications and a proposal to create a 'simplified' version.

This sparked a considerable debate on this proposal and detailed discussion on the very nature of the format of the current MilCAN A specification. Various actions were noted to develop a more "Navigable" format that would make it much easier for a system designer to refer to.

Conformance testing also provided a subject for considerable debate, progress to date had been good but still required members to make hardware available in order to validate the test facility.

A number of issues had been raised by conformance testing that required a solution. Hence, the conformance sub group agreed to meet separately to sanction the issues.

Demand to join the working group remains high and a presentation was made by a business that could support the working group and provide advice on the physical layer. It was thought that sufficient experience resided in the group so no changes to the membership were foreseen.

The meeting was concluded with sufficient time to discuss publicity actions and the forthcoming DVD exhibition at Millbrook in June.

The next meeting will be at Wittenstein HQ, Harthausen Germany on 23rd & 24th September 2008.

Andrew Watson

Ultra Electrics Electronics

Ultra Electronics, which employs over 3,000 people in the UK and North America, focuses on high integrity sensing, control, communication and display systems with an emphasis on integrated Information Technology solutions. The Group concentrates on obtaining a technological edge in niche markets, with many of its products and technologies being market leaders in their field.

The company was started in **1920** as Ultra Electric Ltd. for the production of domestic radios. In **1961** the domestic television and radio business was sold and the first Ultra Electronics Ltd. (UEL) was formed.

1977 saw the acquisition of the Ultra Electronics by Dowty Plc, of which the Electrics site in Cheltenham were already part.

15 years later, the Dowty group of companies were acquired by the TI Group, in **1992**.

TI Group Plc then sold six of the Electronics Systems Division companies of the Dowty Group to a management buy-out team, to form the "second" Ultra Electronics Ltd Company in **1993**. Electrics in Cheltenham were one of these six founding divisions.

In **1996** Ultra Electronics Holdings Plc was floated on the London Stock Exchange.

Ultra Electronics Electrics in Cheltenham is a recognised centre of excellence in Electronic Systems, Human Machine Interface (HMI) solutions, Lighting and High Integrity Harnesses. The site is 220 people strong with products installed in a wide range of civil and military aircraft, armoured vehicles, ships and submarines. Ultra EE supplies to prime contractors, systems integrators and end users.

Tony White
Ultra Electrics Electronics

MilCAN Certification

The conformance facility at Sussex University is now available for use by any subsystem manufacturer claiming MilCAN compatibility. Visit www.vetronics.org or send an email to info@vetronics.org for further information.

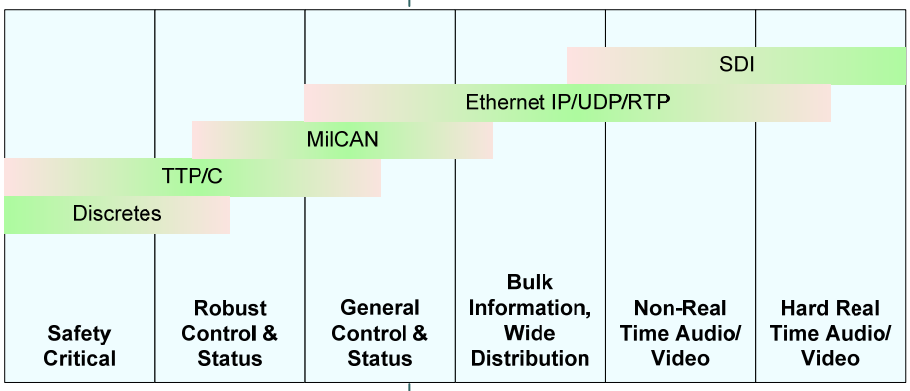
Inside this issue:

ESTABLISH, MAINTAIN AND BROADEN THE USE OF MILCAN AS THE DEFINITIVE INTEGRATION STANDARD FOR MILITARY LAND VEHICLE SUBSYSTEM COMMUNICATIONS

SELEX GALILEO Development Facility Informs Vetronics Architecture Trades

The need for an improved land vehicle fleet will shortly force tough decisions to be made in the field of vetronics architecture, with far reaching implications. The choice of bus standard(s) for the core infrastructure of future platforms will depend upon performance and future scalability, as well as industry perception of the initial development risk and long-term supply chain support prospects.

Figure 1: Bus Applicability



A subjective view (considering performance, cost and time) of the applicability of some candidate technologies to typical vetronics requirements. This highlights the considerable overlap between technologies, and thus the need to understand the strengths and weakness of each.

Under private venture investment, SELEX GALILEO has produced a Vehicle System Integration Laboratory (VSIL), capable of informing these trades, through the integration of a range of advanced mission equipment and vetronics infrastructure components into a restored FV432.

The VSIL, pictured in Figure 2, made its first public appearance as a centrepiece of the Finmeccanica stand at DSEi last year and provides a facility to evaluate and develop integrated systems aimed at improving armoured vehicle situational awareness and survivability.

Figure 2: VSIL Interior View

The system demonstrates a scalable solution for 24-hour, 360-degree close combat situational awareness, provided to four crew stations in the form of independent real-time displays. An integrated Self-Defence Weapon (SDW) system and sight provide a steerable narrow field of view, whilst a high-resolution map and inertial navigation system provide detailed battlefield awareness. The SDW can be automatically cued to target positions, for example those detected by the integrated shot detection subsystem.

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Chairman's Voice

Welcome to the latest issue of MilCAN matters.

As reported in the last Chairman's voice, we have discussed ways to make improvements to the specifications to make them more readable and to make more visible the mandatory requirements from those that are optional enhancements or system specific. Look out for changes that may appear in the next few months.

Thoughts of making available an existing source code for a MilCAN stack under a suitable Open Source Licence have been put on hold because the quality of the code was not considered of a sufficient standard for public release. If this code can be improved then this decision could be reconsidered.

The conformance facility at Sussex University is now available for use by any subsystem manufacturer claiming MilCAN compatibility. Why not become one of the first to get a MilCAN approval!

The next MilCAN meeting will be held at Wittenstein HQ, Harthausen Germany on 23rd & 24th September 2008.

Bob Connor
VSI Technical Leader
QinetiQ Ltd

Integrated Network Enabled Capability for close-combat is provided through an interface to off-vehicle ad-hoc wireless network. This enables dismounted remote sensor threat detection and video data to be accessed by the vehicle crew, allowing monitoring of non-line-of-sight or tactically important positions from the safety of the vehicle.

One of the key tenets of the VSIL development was to select only products and infrastructure that are realistic and affordable in the context of an Armoured Fighting Vehicle (AFV). This policy determined that the vetronics infrastructure should be compliant with VSI guidelines. Consequently, VSIL adopts the Serial Digital Interface (SDI) for real-time video and audio distribution, Ethernet/ Internet Protocol (IP) for off-vehicle data interface and MiLCAN for control and status.

In implementing a MilCAN solution, SELEX GALILEO has explored the benefits and constraints of the bus. Software engineering effort focussed on the application layer; with nodes created at all crew stations, the navigation subsystem, the SDW and the image processing subsystem. Support was received from Accutest Ltd and Sussex University in realising the physical interfaces and software stack of the data link, respectively.

Since the initial demonstrations of 2007, the capabilities of VSIL have been improved. An interface to multiple dismounted Data-Enabled Personal Role Radios (DE-PRR) has been added by extending the MilCAN message set. GPS receivers at each DE-PRR-equipped soldier, enable the locations of each dismount to be shared with the vehicle, and displayed as graphical markers on the tactical map. Secondly, colour cameras can now be demonstrated in place of some or all thermal imaging cameras on a mission-by-mission basis, without changing the user interface. An example display with these features is shown in Figure 3 with two dismount positions marked.

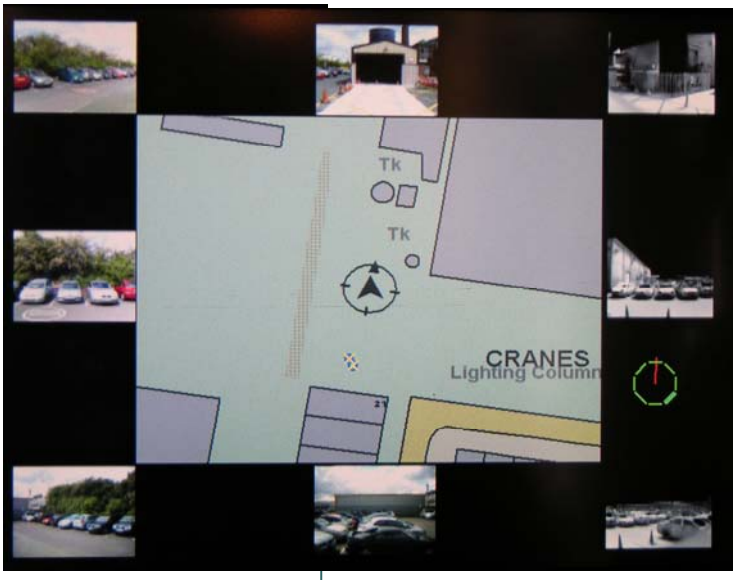
During VSIL development, the following observations have been made relating to MilCAN:

- Industry support for the underlying physical CAN bus is good with hardware and test equipment being readily available
- Full compliance with the standard circular military connector requirements of MilCAN is relatively costly, especially in a linear-multi-drop network where the necessary T-pieces are not manufactured
- MilCAN stack software is available, although support for a wider range of common processor types needs to be in place before subsystem manufacturers can embed MilCAN directly into standard products
- MilCAN message sets and applications have been found to be simple to develop, integrate and test and have been reliable in use
- As a 1Mbit/s bus, loading must be carefully managed. Even with the apparently modest bandwidth demands of a seven-node system, the simultaneous exchange of weapon system position demands and reports and multiple target detection positions, all requiring involvement of real-time display graphics and user interaction, posed significant implementation challenges. Given the constraints of off-the shelf hardware, asynchronous messages were found necessary to achieve a responsive user interface with minimal message overload, even though such messages are discouraged by the standard
- Significant software effort was applied to implement the optional MilCAN multi-frame messaging technique, however, it was later found that there is little support for this amongst other MilCAN users.

In conclusion, MilCAN undoubtedly has the necessary performance and determinism for general control and status functions within the typical land platform and, critically, is reasonably affordable. However, the question remains whether the extensively supported but less deterministic Ethernet protocols, and the more costly, high integrity Time Triggered Protocol (TTP) standards, will co-exist alongside MilCAN or tend to coalesce to replace it. The unique capabilities and open architecture approach adopted within the SELEX GALILEO VSIL ensure that it is well suited to inform these and related integration decisions for future programmes including FRES.

Guy Davies
SELEX GALILEO

Figure 3: Typical VSIL



"...MilCAN undoubtedly has the necessary performance and determinism for general control and status functions within the typical land platform and critically, is reasonably affordable"

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MilCAN

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Establish, maintain and broaden the use of MilCAN as the definitive Integration Standard for Military Land Vehicle subsystem communications

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