

ASAM MCD-1 (XCP) protocol for high performance data acquisition

“Because of the ASAM MCD-1 (XCP) standard used by both partners, the integration of ETAS’ ES400 measurement modules into MBtech’s PROVEtech:VA software was only a matter of hours.”

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I Summary

Challenge: Vehicle dynamics development and test applications require the acquisition of ECU data at high data rates. Furthermore, the time correlation between different data channels needs to be recorded with very high precision.

Solution: Integration of ETAS’ ES400 Ethernet-based measurement modules using the ASAM MCD-1 (XCP) protocol allows an extremely fast and easy integration of high performance data acquisition capabilities, with only minimal modifications of the existing solution.

Key Benefits: Use of the already implemented ASAM MCD-1 (XCP) communication protocol enables our customers to integrate high bandwidth and high performance off-the-shelf products into their solutions within hours.

II Situation

For ECU function development, long-term measuring tasks and customer-specific vehicle acceptance testing, MBtech’s electronic solutions rely on the PROVEtech:VA mobile measuring system. This system is used mainly for tests of complex control systems in the chassis area (i.e., brake systems, steering, chassis and driver assistance systems).

The MBtech measuring system bundles all measurement data acquired onboard the vehicle. For application on the PC, it presents itself as an ECU from which the user can query measurement variables. This is accomplished by use of standard tools such as INCA, the universal measuring, calibration and diagnostics environment from ETAS.

III Challenges

The MBtech measuring system not only acquires sizeable data streams from multiple ECUs generating well over 16,000 signals per cycle each, it also supports quality assurance through time-synchronous recording of sensor reference data, such as voltage, pressure, and image-specific data, and captures CAN and LIN bus data as well. The open, PC-based system features the complete implementation of an ASAM MCD-1 (XCP) host. ASAM MCD-1 (XCP) capable ECUs or measurement modules can be controlled via CAN or through the standard USB and Ethernet PC interfaces.

Specific vehicle dynamics applications require a variety of different sensors to be acquired at high sampling rates. So far, other measurement modules provide neither the required sampling rates nor the bandwidth needed for these applications. Additionally, timely correlation of captured signals must be provided with sufficient accuracy which is not accomplishable with these CAN bus measurement modules.

IV Success strategy

The ETAS measuring modules of the ES400 family are the first commercially available measuring devices to support the ASAM MCD-1 (XCP) protocol. They are therefore ideally suited to deployment in conjunction with the MBtech measuring system. Data processing onboard the ES400 modules is configurable in the software. Pre-filtering the measurement signals is no longer required. Thanks to their high 10 kHz scan rate, accuracy and time synchronicity, the ETAS measuring modules even meet the most sophisticated demands of driving dynamics testing.

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Compared to the previously deployed CAN-based modules and PCI-based measurement boards, the ES400 modules are decidedly compact for in-vehicle use, carry a lower price tag and have proven their measuring accuracy in comparative testing.

The experts at MBtech integrated the ES411 A/D Module and the ES420 Thermo Module in the PROVEtech:VA software within a matter of hours. They carried out the in-vehicle cabling and physical integration of the modules with similar ease.

V **Challenges during the project**

The ASAM MCD-1 (XCP) protocol was not developed with this specific application in mind, so difficulties were expected in defining how non-standard functionality could be implemented. Surprisingly, only a minimal amount of additional regulations and agreed practices of about 2% of the ASAM MCD-1 (XCP) specification had to be added to the successful integration and usage of ASAM MCD-1 (XCP) in this application.

VI **Business benefits**

Major benefits of the project were that we overcame hardware limitations of CAN bus measurement modules by enhancing the data measurement bandwidth by a factor 100 (by replacing CAN communication links by Ethernet connections). We had a large time and cost savings due to easy integration and standard Ethernet-based communication technology and gained flexibility in configuration of data acquisition modules.



Figure 1: ETAS measurement modules supporting the ASAM MCD-1 (XCP) protocol