

Linking Ethernet and CAN

Pressure of time and faster development processes require automotive measurement systems that can quickly be adjusted to different measurement applications. To achieve this, the system bus X-Link connects automobile standards.

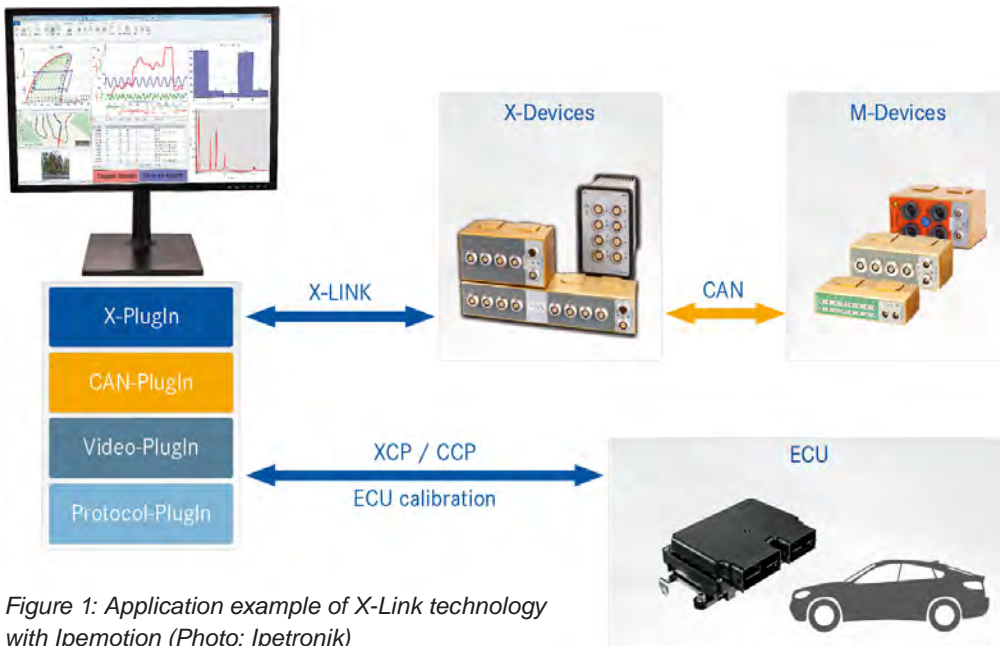


Figure 1: Application example of X-Link technology with Ipemotion (Photo: Ipetronik)

technology in combination with Ipemotion as a complete software solution or for powertrain applications, by a connection to typical engine application systems (Etas Inca, each software working with A2L files). System configuration is supported with Ipemotion as well as the Ipeaddon Inca 5 for Inca. The user is able to analyze measurement data according to the application either with Ipemotion or with the common analysis packages and software tools

The Ipetronik system bus X-Link provides a measurement system that connects automobile standards such as Ethernet, CAN, IEEE1588, and XCP. With this combination of technologies, a decentralized future proofed automotive measurement system is available. The system grows continuously with additional available technologies on the market, without having to redesign existing measurement modules.

X-Link technology stands for the time synchronous connection of fast Ethernet measurement technology with CAN measurement technology via only one bus to the Ethernet interface of the PC. The scalable hardware solution covers all areas of decentralized measurement

Vector CANape, NI Labview, AVL, ATI Vision, and Etas Inca. Besides the longtime proven CAN measurement technology for physical values such as pressure, temperature, voltage, and flow rate (up to maximum 2 kHz/channel), there is also an increased need of faster measurement channels up to 100 kHz/channel: for example, to optimize injection behavior or to perform vibration, oscillation, and acoustic measurements

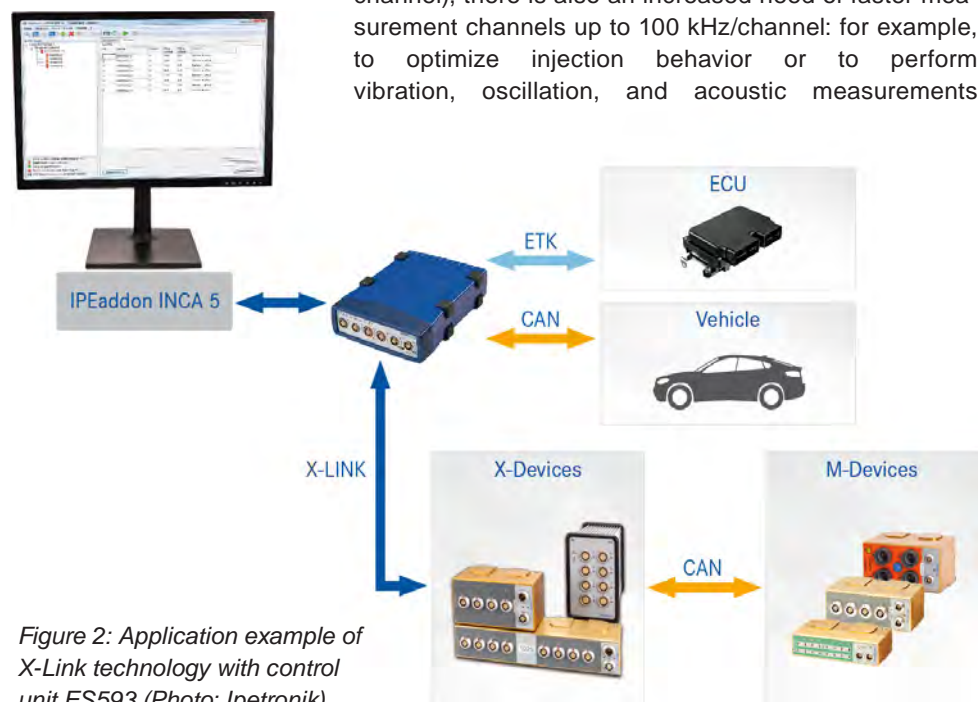


Figure 2: Application example of X-Link technology with control unit ES593 (Photo: Ipetronik)

(NVH applications) simultaneously to standard signals – with the eternal objective to further reduce test phases and costs.

Time synchronization of all signals as well as a familiar software interface avoid additional offline editing of signals and time-consuming induction and conversion steps. The user's proven and familiar workflow remains for a fast and flexible work. While existing bus systems only have a limited use for these requirements – because of limited channel sampling rates, missing configuration opportunities for individual devices, or limited range – available technologies fail if already existing measurement components have to be continuously used in the system. With X-Link technology, a measurement system is available, which ensures



Figure 3: Mx-Sens2 8
(Photo: Ipetronik)

a symbiosis of two bus systems and therefore an optimal workflow.

After many years of experience in control unit measurements via XCP-on-CAN, XCP-on-Ethernet and XCP-on-Flexray, this intelligent link of standards provides a ▶

Table 1: Current possible sampling rates per channel in different software applications

Sampling rate/channel	IPEmotion	INCA	CANape (DAIO)	DIAdem (DAC XCP driver)	Test bench/ SW (with ECU-interface)
X-PlugIn	100 KHz				
IPEaddon INCA 5		100 kHz			
A2L	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz
CANdb	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz

□ Ipetronik multi-platform driver

□ XCP standard (XCPonEthernet)



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hardware platform, which is able to run up to 100 kHz/channel sampling rate due to the used software application. Already existing CAN measurement technology can be used in the system time synchronously.

Usage and overview

Software connection: Through the multi-platform driver developed by Ipetronik, the Ipeaddon Inca 5 is available

besides Ipemotion and the X Plugin for the configuration and analysis of measuring data. Due to the universal concept of the driver more third party software applications are possible, which can be equipped with the same functionality and performance. With the multi-platform driver, the limits of standard XCP protocols (maximum 10 kHz/channel) can be removed (see Table 1).

Application with ES593: For powertrain applications, the widespread ES593 interface module from Etas serves as the ETK interface for the vehicle ECU. Different physical measured values are acquired time synchronously and in parallel. Inca is used as an application software. With assistance of Ipeaddon Inca 5 such a system can be realized fast and efficiently. The entire Ipetronik measuring chain can be configured in Inca and appears as an additional measurement system in the work area of Inca. Due to the CAN tunneling of CAN modules via Ethernet, another CAN input on ES593 for vehicle CAN data is available. High voltage modules by Ipetronik are able to cover characteristics of hybrid and e-drive technology.

X-Link provides a consistent tool chain for X and CAN measurement technology from configuration until analysis or reporting. Its modules can be integrated in existing software applications (Inca working area, Diadem circuit diagrams). Different migration paths according to specific applications are possible: the X module is



Figure 4: Sx-STG
(Photo: Ipetronik)

usable as a wholesome attendant to expand an existing CAN system or to cover higher sampling rates without buying another system. It can also be used for CAN monitoring. X devices dispose of the monitoring, for example for test bench applications. Measuring data can be visualized in parallel with a standard CAN interface on the test bench.

Currently, the Ipetronik X device family includes the Mx-Sens2 4 with up to 100 kHz/channel, as well as Sx-STG with up to 40 kHz/channel. The self-developed multi-platform driver provides the software driver basis to use the high sampling rates in all software packages for which there is a driver available. Thanks to the standardized Ethernet interface, the system is usable with a PC, a notebook, a test bench, and in future with Ipetronik logger platforms. The combination of proved and existing measuring technology with the newest technologies is future oriented. Users can decide to buy new measurement technology or integrate it into the existing system: the X-Link technology creates a basis for flexible and especially efficient measurement. ◀

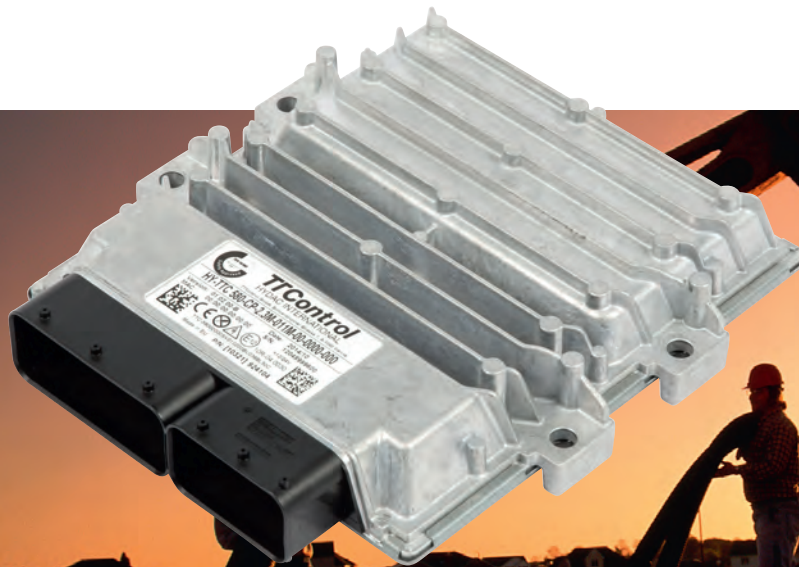


Figure 5: Mx-Sens2 4 (Photo: Ipetronik)



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