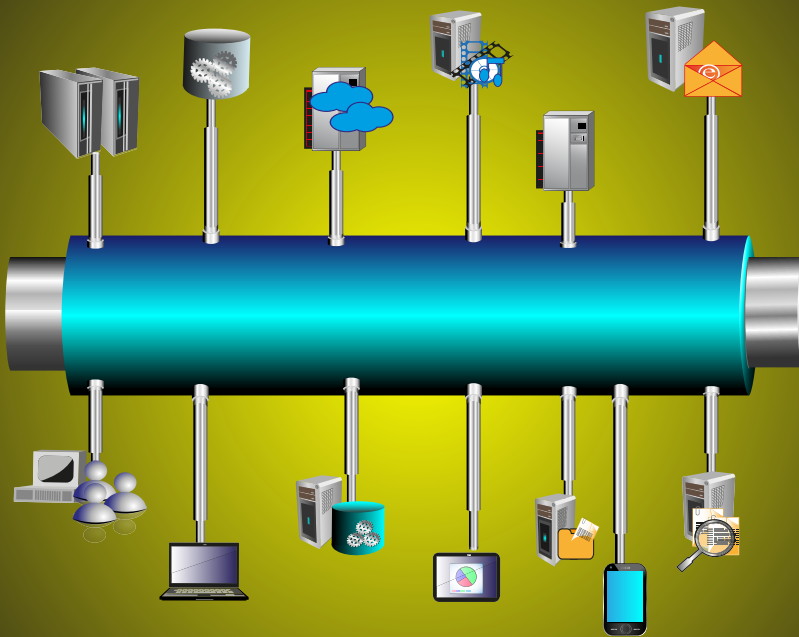


Modularity without interoperability testing does not make sense



Conformance testing is not sufficient to prove the interoperability of devices. A “golden system” or plugfests are needed additionally.

(Source: AdobeStock)

Increasingly, network system designers need to develop systems, which are highly configurable. In extreme, each system is unique. Modularization is the solution. Of course, to reduce the development effort, the module interfaces should be standardized. This can be done proprietarily or openly meaning that official standardization bodies such as ISO and IEC or industry associations such as CiA or SAE release such interface specifications.

In case of open network approaches, system designers demand increasingly conformance tested products. This is why in the automotive industry CAN conformance testing on the chip level is on the agenda since many years. Nearly all CAN protocol controllers used by automakers are conformance tested. Since the beginning, Bosch provided such a test tool to the CAN chipmakers. In the meantime, there are two CAN conformance test plans internationally standardized: [ISO 16845-1](#) for the CAN data link layer and [ISO 16845-2](#) for the CAN transceivers including those with low-power mode and selective wake-up capability. Typically, those conformance test systems are based on the conformance testing methodology and framework as standardized in the [ISO 9646](#) series.

Conformance testing is also a topic for CAN-based higher-layer protocols such as CANopen. CiA provide since many years, a CANopen conformance test tool, which implements the CANopen test plan as specified in [CiA 310-1](#). The CiA office uses this tool for conformance

testing. The CANopen conformance testing is not mandatory. Unfortunately, there are some devices on the market claiming CANopen conformity, but they just may contain traces of PDOs and SDOs. Those products make the system designers unhappy. Lessons have been learnt: For CANopen FD devices conformance testing at CiA office is obligatory.

For the SAE J1939 protocols no conformance test plans exist. The J1939-based Isobus network standardized in the ISO 11783 series provides conformance test plans developed by the nonprofit [AEF association](#). All Isobus-labeled electronic control units (ECU) must be conformance tested by one of the authorized test houses.

Conformance testing is like spellchecking in human communication. It just tests the behavior of one single

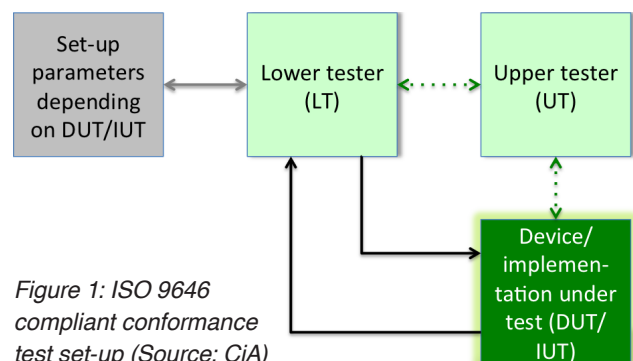


Figure 1: ISO 9646 compliant conformance test set-up (Source: CiA)



Figure 2: Impression from the Isobus plugfest in Bologna (Source: AEF)

device. The device-under-test (DUT) is justified that its communication interface complies with the conformance test plan. Normally, the test set-up comprises the DUT and the lower tester (LT) generating test pattern and evaluating the response on the bus-lines. If also the interface to the higher-layers is tested, an upper tester (UT) is needed. The LT and the UT are linked by means of an interface, in order to evaluate the reaction on the test pattern on the upper interface. As said, conformance testing does not prove the interoperability between devices. This is the same as in human communication: Spellchecking does not guarantee that the reader interprets correctly your text; it just demonstrates that you have not violated grammar rules and that the words are well spelled.

Interoperability this is, what the system designers are interested in. Of course, conformance testing improves the probability of interoperability, but does guarantee it. There are two options to test interoperability. The “golden system” is a reference network system, to which you connect the DUT and test, if it communicates with others and does not disturb the communication between them. The second approach is a plugfest. Plugfests are test events, in which module suppliers connect their devices to those of other manufacturers. CiA has organized, for example, several plugfests for CAN FD implementations. The AEF association arranges twice a year plugfests for Isobus-compliant ECUs. The next one is scheduled in Lincoln (Nebraska) for May and the following is planned in France in September. CiA also put on bi-annually plugfests for CANopen Lift devices. In March, the next one will take place in Nuremberg (Germany). CiA organizes also generic CANopen plugfests on demand of interested parties. Later on this year, CiA plans to schedule a CANopen FD plugfest.

Interoperability tests for the next generation CAN protocol, CAN XL, will be arranged, when first implementations are available. CAN XL with payloads up to 2048 byte is specified by a CiA Special Interest Group (SIG). Volkswagen initiated the protocol development. Intended applications are small radars, advanced driver assistance systems, and eCall for volume cars.



Author

Holger Zeltwanger
 CAN Newsletter
pr@can-cia.org
www.can-newsletter.org



A Wireless CAN Bridge That Makes Light Work of Your CAN Connections

The Kvaser Air Bridge Light is a configuration-free wireless CAN bridge, designed for environments or situations that make wired connection unsuitable or challenging.

- ▶ Two paired units that are ready to go, right out of the box
- ▶ Predictable latency, without sacrificing stability or range
- ▶ Auto baud detection determines correct bit rate
- ▶ FCC and EU compliant

Visit www.kvaser.com/airbridge for more information.