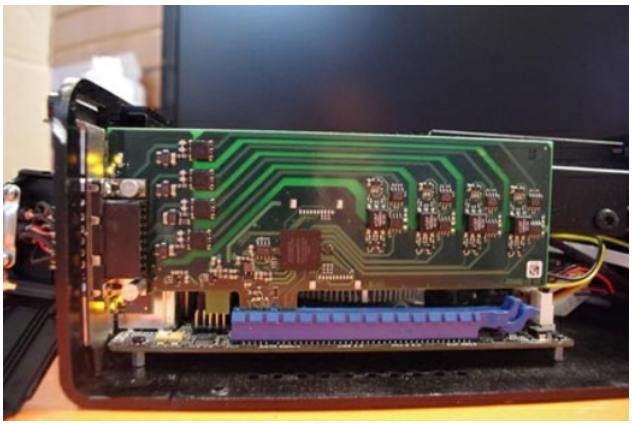
CAN Newsletter Online

Technical proposal could assist switch to CAN FD

At the 14th iCC Kvaser (Sweden) proposed an addition to the CAN FD standard that could simplify the introduction of high speed CAN communication into existing installations: CAN EF, a step between CAN and CAN FD.



(Photo: Kvaser)

ON 12th NOVEMBER 2013, KVASER PRESENTED CAN EF (Controller Area Network - Enhanced Format) to attendees of the 14th international CAN Conference in Paris, France. CAN EF proposes an intermediate step between CAN and the new high performance CAN with Flexible Data Rate (CAN FD) solution that is in the process of being integrated within ISO 11898-1. The proposal was put forward for industry discussion within the context of Hardware Development Manager Kent Lennartsson's paper entitled 'How to implement and utilize high bit-rate in your system'.

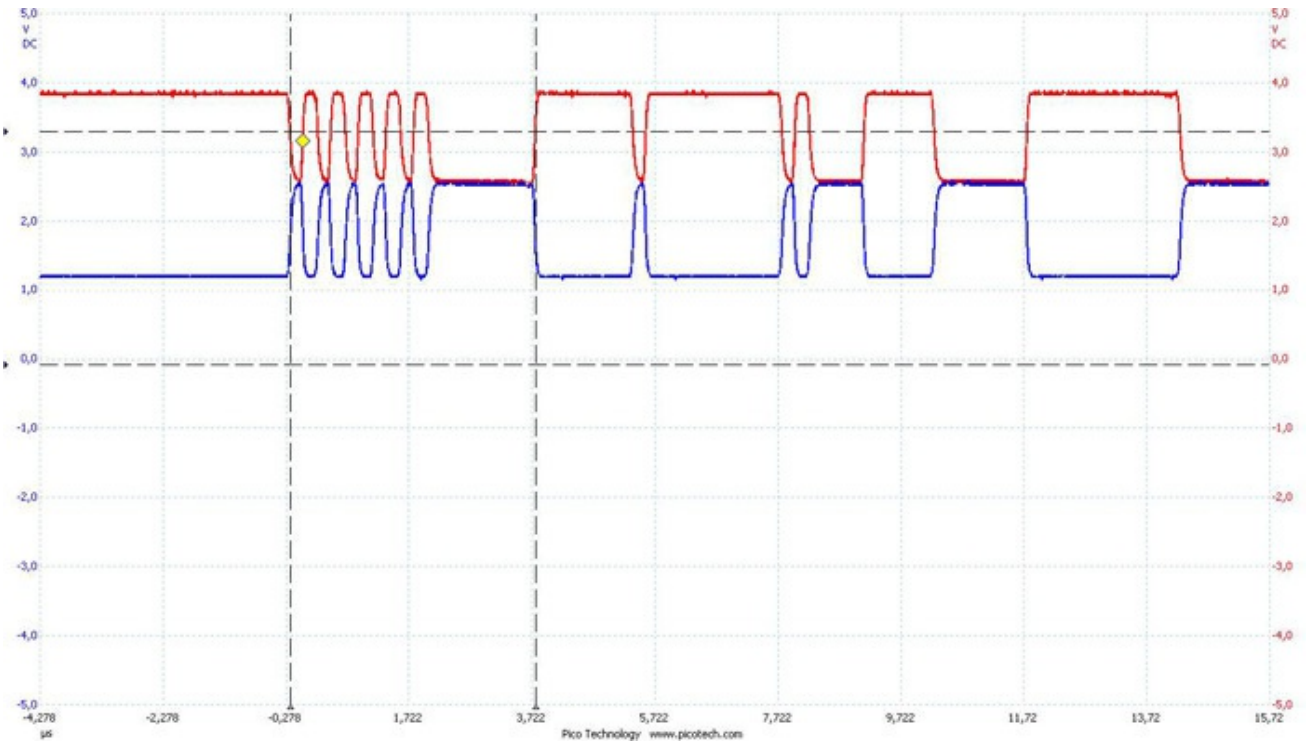
CAN FD provides a highly efficient method of increasing CAN data throughput, by increasing the number of bytes in each CAN-frame (from 8 to 64 bytes), whilst making the CAN-frames shorter. However, this technology cannot be used with existing CAN controllers. In contrast, CAN EF offers higher data-rate communication than CAN by packing the extra bits into the CAN-frames in such way that they can be received by legacy CAN controllers, ensuring full backwards compatibility with existing CAN infrastructure.

Lars-Berno Fredriksson, president of Kvaser commented: "On the one hand, CAN FD provides a high bit-rate, but on the other hand, it is not backwards compatible with the current version of CAN. Systems and modules have to be redesigned to take advantage of CAN FD. We see that CAN EF could facilitate the industry's move to CAN FD. The reality is that it will take time for the industry to switch to what is an entirely new communications standard; CAN EF could give CAN users quicker and simpler access to greater data rates in the meantime."

The performance of CAN EF would be within the range of 50 % to 90 % of CAN FD in similar circumstances. Kent Lennartsson said: "From a silicon vendor's point of view, a great deal of the logic would be common across CAN, CAN EF and CAN FD, making it possible to combine all logic into one unit with a minor increase in gate count compared to CAN FD."

CAN EF works by hiding the high-speed data from the legacy CAN modules, allowing CAN EF modules to be installed into any system to communicate at a higher bit-rate without interfering with any connected CAN-module in use today. This would allow users to replace modules gradually to achieve a progressive increase in data throughput, rather than suddenly render all existing CAN modules and service tools obsolete. For example, in truck applications where J1939 is employed at 250 kbit/s, CAN EF would facilitate an increase in data throughput without altering the basic bit-rate.

CAN EF requires no physical layer modification, but like CAN FD, certain physical architectures will limit its highest usable bit-rate. CAN EF communication could co-exist with CAN FD, potentially allowing CAN EF to act as a technically compatible bridge technology between the existing CAN standard and the future high performance CAN FD protocol.



(Photo: Kvaser)

Depicted here is an oscilloscope printout of the CAN EF signals embedded into classic CAN. In this case, the printout shows CAN at 250 kbit/s with 4 ms between the vertical cursors. The high-speed bits are located in the propagation segment only. The end of the bit, holding the phase segments, is unmodified to secure a correct CAN sample. This method makes it possible for CAN to receive a correct CAN-message where the CAN EF controllers will extract the added information placed in the propagation segment.

CAN FD, developed by Bosch GmbH, is an update to the CAN standard that extends bandwidth well beyond its current limits of 1 Mbit/s and 8 bytes per frame. A first draft of the specification was published in March 2012 and ISO TC22 SC3 WG1 is currently working to integrate CAN FD as an optional feature in the ISO 11898-1 standard, which specifies the data link layer (DLL) and physical signaling of CAN.