

Ethernet Gateway Extends the Reach of CAN Applications

By esd electronics, Inc.

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The bus length extension per CAN repeaters is a myth that is unfortunately being maintained by some manufacturers and vendors.

One of the ingenious features of CAN, the bit monitoring, contributes not only to the enormous reliability of Controller Area Network, but it is ironically also responsible for its biggest drawback, the limited physical distance of the CAN bus. Restricted physical distance is definitely an issue especially for applications such as elevators, security systems and other building technologies. The one and only way to extend the usable bus length without compromising the reliability is to lower the baud rate. In cases where baud rate is not the main focus, e.g. diagnostics and low priority messaging, a CAN bus can be extended as far as the reach of the Internet.

While a distance of roughly 150 ft. at 1 Mbit/sec seems to be restrictive, especially for building technologies, a baud rate of 1 Mbit/sec can nevertheless be considered an overkill for such applications. Experience has shown that the vast majority of automation applications can work sufficiently with baud rates of 500 kbit/sec or even 250 kbit/sec and that includes demanding motion control applications.

The bus length extension per CAN repeaters is a myth that is unfortunately being maintained by some manufacturers and vendors of these devices. CAN repeaters provide primarily electrical isolation and signal conditioning.

While CAN can be operated with a simple twisted pair of wires, the quality of the CAN bus cable can be a major factor in terms of maximum bus length. Poor cable quality will quickly knock a signal strength down below a receiver's threshold. The result will be signal errors and consequently increased bus traffic due to error frames and repeated messages.

CAN repeaters can be used to boost the signal strength and maintain standard bus lengths, but not extend them. The only extension is the one from a poor quality network to a properly functioning network. Ironically, CAN repeaters, due to their internal delay times in the range of milliseconds, will actually shorten the usable bus length in the range of several meters.

Some vendors in the CAN business offer a variety of interfaces that support the communication between two separate CAN networks (e.g. the CAN-CBM-Bridge by esd electronics, Inc. See: <http://www.esd-electronics-usa.com>). Such devices allow to extend a CAN network by a factor of two, but they, too, have latency times due to reception, processing and re-transmission of CAN frames. Another disadvantage is that, for instance, both CAN networks cannot exchange error frames.

Such gateways, however, also post some advantages such as message filtering - to lower the bus traffic between the networks - and the use of different baud rates in the networks.

The ultimate way to extend the reach of a CAN application is the use of Ethernet gateways, which consequently even allow the connection to the Internet.

For instance, the EtherCAN device by esd electronics, Inc. provides operation modes to either connect two separate CAN networks per Ethernet or allow the monitoring of network activities through the Internet.

In the first mode, you can connect two separate CAN networks per Ethernet to maintain almost unlimited

physical distances. Each network will need its own gateway, which in turn will contribute to higher latency times. The EtherCAN also supports message filtering and thus can decrease the number of messages between the networks.

The second mode, operation through the Internet, is supported by the EtherCAN's internal web server. Imagine, having your application run in Australia, but monitoring and analyzing the bus traffic in your office in Chicago. The EtherCAN comes with an extensive PC software package with CAN analyzing and monitoring features.

For more information on the EtherCAN gateway log on to:

<http://www.esd-electronics-usa.com/store/p/34-EtherCAN.html>

or contact Wilfred Voss at wilfred.voss@esd-electronics.com or 413-772-3170.

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esd electronics, Inc. is a supplier of CAN hardware interfaces and gateways. The form factors include PCI, PCIe, cPCI, VME, PMC, PC104, and more. The supported operating systems are Windows, Linux, QNX, vxWorks, and more.

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