

Analysis tool for Industrial Ethernet applications

ET2000: Industrial Ethernet multichannel probe

→ Network monitors are indispensable tools for implementing fieldbus and Industrial Ethernet devices. They are generally not required for users – the built-in diagnostic options should suffice – although in the event of timing problems or potential protocol discrepancies, it may be necessary to use trace tools for logging bus traffic.

With traditional fieldbuses special interfaces are required for tapping into data traffic. With Industrial Ethernet systems one expects to be able to record Ethernet frames via any Ethernet interface. Any notebook should be able to handle this task without additional hardware, although this approach reaches limits with real-time Ethernet systems.

In switch-based solutions the situation is particularly tricky, because switches only forward the frames to the respective target port. This means that no point in the network offers a complete message overview. Even in a situation where a managed switch is used and all frames are additionally copied to a monitoring port for recording, the dynamic response is distorted by the switch. This means that timing analyses are only possible to a limited extent, especially since the Ethernet drivers for most operating systems are not suitable for high-precision time stamping of the recorded telegram frames.

Hub-based technologies contain the entire data traffic in each network segment, although the temporal relationships are topology-dependent due to hub delays. For a detailed analysis of bus timing, synchronized recording has to take place at several points within the network.

EtherCAT offers attractive preconditions in this context, because the delay per device is extremely small by comparison. In addition, only a few frames are in transit thanks to dynamic processing and the frames are visible in the whole network. For device developers it may be desirable to analyze the data stream before and after a device.



With the ET2000 multichannel probe, Beckhoff introduces a versatile piece of hardware for analyzing any Industrial Ethernet solution. With eight ports, this device enables unlimited synchronized recording of up to four independent channels at a speed of 10 or 100 Mbit/s. All real-time Ethernet standards such as EtherCAT, PROFINET, etc. as well as conventional office Ethernet networks are supported.

Through its compact and rugged design, the ET2000 is ideal both for local application on machines or in the laboratory. The four channels enable recording and analysis of separate networks or different points within the same network. All frames in transit – in both directions – are furnished with a high-precision timestamp in the probe hardware and copied to the Gbit uplink port. The high timestamp resolution of 1 ns enables very precise timing analysis of the connected network segments. The ET2000 probe is transparent for the connected buses. Thanks to the low cycle delay of < 1 μ s, the influence on the system is very small.

The device can be connected to any Gbit Ethernet interfaces on the PC side. It is supplied with a Windows driver based on the open WinPcap software interface. This means that the versatile ET2000 probe can be used with freely available network monitors such as Wireshark (Ethereal) or with special tools such as the EtherCAT analyzer.