

# CANoe.IP, Version 7.2

Developing, simulating and testing embedded systems with Ethernet

## Overview of Advantages

### Embedded Ethernet

- > Extraction of periodic signals from Ethernet packets and their display in Data and Graphic windows
- > Processing of Ethernet packets and signals extracted from them in CAPL
- > Use of panels to display and influence signals
- > Sending of your own Ethernet packets configured with Ethernet Packet Builder
- > Programmable sending of Ethernet packets in CAPL
- > Simulation of Ethernet nodes and gateways
- > Testing of gateway functionality by analyzing the communication on different bus systems
- > No effect on network communication by the Windows operating system or other applications thanks to isolated network interface. This may be a necessary requirement, especially in real-time systems.

### Remote CAN Analysis

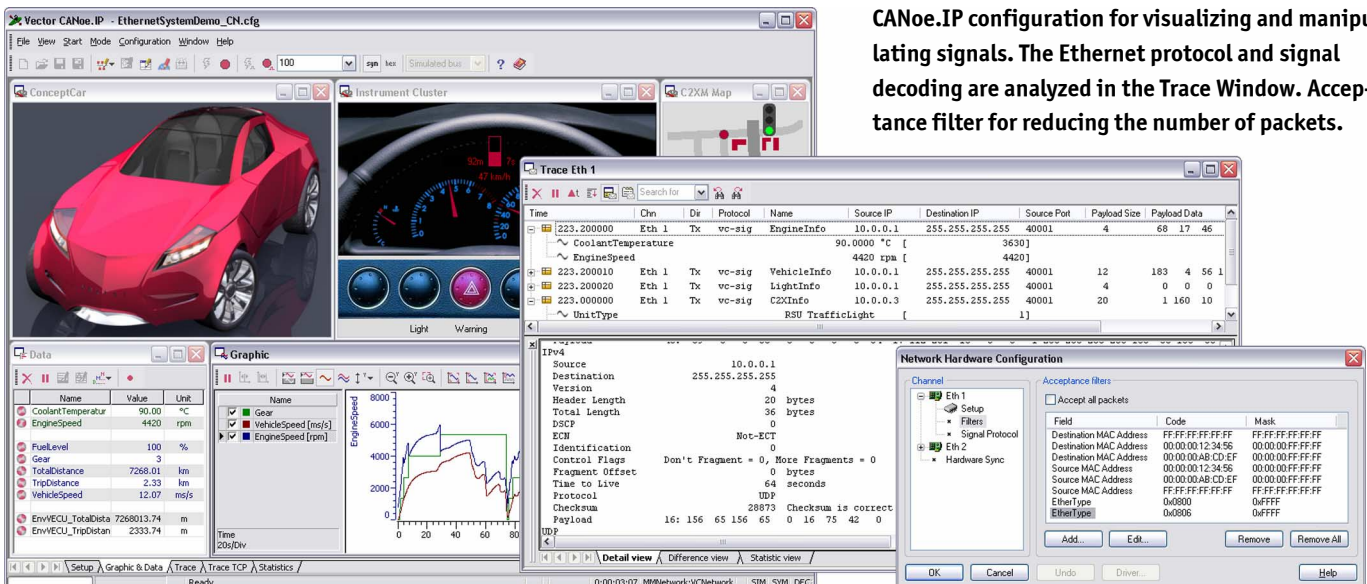
- > Wireless receiving and sending of CAN messages in case of difficult to access or mobile CAN bus systems
- > Usage of the original time stamps of the remote CAN bus e.g. in the Trace Window
- > Simultaneous analysis of the CAN communication on multiple vehicles
- > Remote monitoring of CAN bus systems via WLAN/Ethernet

Ethernet-based networks and the protocols built upon them continue to grow in importance in the embedded environment. In contrast to IT networks in the office area, the main focus is on transmission of most periodic signals. Furthermore, real-time Ethernet systems generally react sensitively to disturbances of connected analysis tools. Option .IP lets you extend CANoe by adding support of Ethernet systems. Exclusive use of Ethernet interfaces on the PC prevents Windows and other applications from affecting the real-time Ethernet system.

Integrating Ethernet in CANoe also gives you the ability to transparently transmit CAN messages via WLAN and/or Ethernet (Remote CAN Analysis). A supplemental CAN-(W)LAN gateway and the bus system option CAN is needed for this.

### Application Areas

In **vehicle development**, the use cases involving support of Ethernet-based networks are generally the same as those in CAN bus systems. Furthermore the function Remote CAN Analysis opens up new fields of use, such as simultaneous analysis of the data communication of multiple vehicles in Car2x systems, as well as remote control of engine test benches and HIL tests. A key benefit of CANoe.IP is measurement of delay times in signal conversion via gateways to other networks in the vehicle. This makes it possible to track diagnostic information through the entire vehicle and check its consistency, for example. Furthermore, intentional manipulation of Ethernet packets makes it possible to reproducibly



CANoe.IP configuration for visualizing and manipulating signals. The Ethernet protocol and signal decoding are analyzed in the Trace Window. Acceptance filter for reducing the number of packets.

test embedded implementations and increase their robustness against protocol errors.

In the development, and especially testing, of **agricultural and construction machines**, you benefit from the ability to transmit CAN messages via WLAN and Ethernet. You can conduct analyses, diagnostic accesses and tests without having to drive along on the machine yourself.

In the **industrial automation** field you can use this remote access capability to communicate with difficult to reach systems.

**Functions**

Option .IP extends the functional range of CANoe by adding Ethernet-specific functions and the ability to transmit CAN messages via WLAN or Ethernet.

**Special functions**

**Embedded Ethernet**

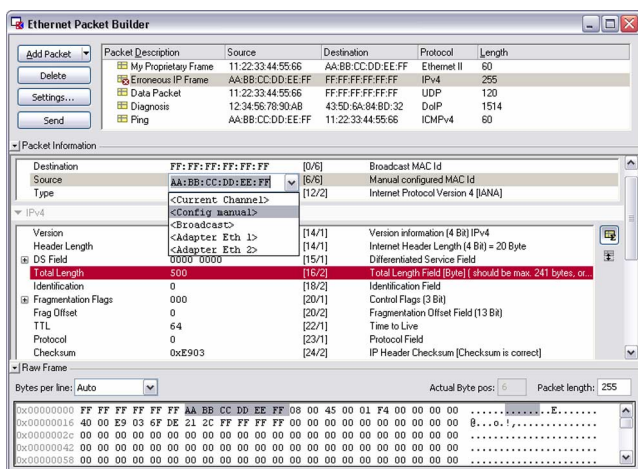
- > Configuration of up to four Ethernet channels (10/100/1000 Mbps)
- > Support of Ethernet and Ethernet-based protocols such as IP, UDP and TCP
- > Display of protocol header information in the Trace Window
- > Use of your own signal protocol decoder DLLs
- > Ethernet Packet Builder for configuring and sending Ethernet packets
- > Nodelayer DLL for accessing Ethernet from CAPL
- > Configurable exclusive use of Ethernet interfaces by CANoe.IP

**Remote CAN Analysis**

- > Transparent transmission of CAN messages via WLAN (requires additional hardware and the bus system option CAN)

**Hardware**

At least one Ethernet interface is required to analyze embedded Ethernet systems. Up to four Ethernet interfaces may be used as measurement channels, depending on the specific application. The Remote CAN Analysis via WLAN or Ethernet requires an additional CAN-(W)LAN gateway. In the case of WLAN the test computer requires a WLAN receiver. You can request a current list of supported (W)LAN gateway modules by contacting Vector.



**Ethernet Packet Builder is used to create and send out Ethernet frames conveniently and without programming. Correct as well as faulty packets can be easily created using the configurable checksum and length calculation.**

**> New Functions of Version 7.2**

- > Simulation of multiple network nodes in CAPL: Individual allocation of MAC addresses and IP addresses for each CAPL node. Dedicated instance of the TCP/IP communication software for each CAPL node. Direct access to fields of different protocols (Packet API). Socket connections with TCP and UDP (Socket API).
- > Improvements to Ethernet Packet Builder: Support of additional protocols such as DoIP and ICMP. Users may choose to use either fixed source MAC addresses or the MAC address of the current Ethernet adapter. Automatic or manual computation of individual checksums of protocols.
- > Access to IP protocols from the Signal Decoder DLL
- > Display of Ethernet connection status in graphic and data windows