Use of Vector CANoe’s open interfaces to integrate NI LabVIEW
## Agenda

**Overview**

- Motivation
- Scenario: Test
- Software connectors
- Solution and Interfaces
- Solution Illustration
- Features of this approach
- FDX Generator
- FDX Generator - UI
- Summary and Documentation

© 2012. Vector Informatik GmbH. All rights reserved. Any distribution or copying is subject to prior written approval by Vector.
**Overview**

- **Vector CANoe** is a tool for development, testing and analysis of individual ECUs and complete ECU networks. It supports the entire development process. CANoe’s functions and configuration options are used by network designers, development and test engineers at OEMs and suppliers.

- **National Instruments LabVIEW** is an engineering tool for development of measurement, test and control systems. It provides drivers for the integration of control and measurement hardware and supports the development of complex simulations.
Motivation

Why connect both systems?

- Each system has individual focus and strengths
  - CANoe supports automotive standard bus systems and protocols
    - Bus systems: CAN, LIN, MOST, FlexRay, Ethernet, J1708, WLAN
  - Various OEM specific protocols
  - LabVIEW supports many Instrument Drivers
    - Oscilloscopes, digital multimeters, function generators, spectrum analyzers, power supply units, etc.
    - Interfaces: RS232, USB, Ethernet, LXI, PCI, GPIB, etc.
Scenario: Test

**CANoe**

restbus simulation
Scalable: PC, VN80xx, RT rack...

TestExecution

Bus systems
FDX

I/O, fault injection, signal conditioning

**SUT**

**LabVIEW**

Measurement & control devices

**VTS**
Software connectors

- CANoe provides easy to use access to System- and Environment variables as well as Bus signals.

- LabVIEW provides connectors to bind In- and Out Variables
CANoe supports an UDP based fast data exchange (FDX) between CANoe and standalone applications. The FDX protocol enables read and write access from external applications to the CANoe world. The data sources and data sinks are CANoe System Variables, Environment Variables and Bus Signals.

FDX can also be used to connect to remote computers.

LabVIEW allows the creation of SharedLibraries (DLLs) from LabVIEW VIs. Exported VI functions can be used by external applications.

The approach is to create an executable that uses a LabVIEW VI and connects it via the LabVIEW Runtime Engine and the FDX protocol to CANoe.
Solution Illustration

CANoe

FDX/UDP protocol

LabVIEW RTE

VI SharedLibrary

FDX executable
Features of this approach

- Bi-directional communication between LabVIEW VI and CANoe configuration.
- To control the connected system LabVIEW and/or CANoe can be used.
- CANoe is able to integrate typical VIs without the need for modifications on the VI. Any VI that is ready to be used as Sub-VI, can directly be used in a CANoe configuration.
- The process steps can be split according to responsibilities and functions.
- Runtime environment:
  - The CANoe simulation can be run on any supported hardware (CANoeRT).
  - A Windows computer and the LabVIEW runtime environment is required to run the FDX executable.
FDX Generator

- CANoe 8.0 provides an easy to use tool, to connect CANoe configurations to LabVIEW VIs.
  - No code needed to connect LabVIEW instruments to CANoe simulations

- Manual steps:
  - Define LabVIEW VI In- and Out- connectors
  - Use LabVIEW Application generator to create a shared library
  - Use Vector FDXGenerator to create a standalone executable that manages the communication between CANoe system variables and LabVIEW connectors
  - Run CANoe and stimulate the VI's in connectors and visualize the VI's out connectors
FDX Generator - UI

Project management: Remembers CANoe project, LabVIEW VI to easily update changes

CANoe connection: Automatically configure currently running CANoe for VI use

VI connection: Select LabVIEW VI

Generation: Create the FDX executable
The FDX protocol provides a flexible way to communicate between CANoe and other applications like LabVIEW.

CANoe provides...

- complete FDX protocol description, for own implementations
- FDX C++ sample program
- Documentation on using FDX for LabVIEW interaction
- Specific tool: FDXGenerator for LabVIEW
Thank you for your attention.

For detailed information about Vector and our products please have a look at:

**Hall 1, Booth 1830**

[www.vector.com](http://www.vector.com)

Gunnar Stein
Vector Informatik GmbH
Ingersheimer Str. 24
70499 Stuttgart