05-00

J2534

Background and Upcoming changes

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DG Technologies

J2534 Set of Standards

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J2534-1: **Recommended Practice for Pass-Thru Vehicle Programming**

Last published version 12/2004

J2534-2: **Optional Pass-Thru Features**

Last published version 04/2010

J2534-3: **Conformance Test Cases for an SAE J2534-1 Device**

No published document

J2534-1

- SAE J2534-1 defines an Application Program Interface (API) that can be used by Vehicle Manufacturers for reprogramming emission related modules.
- This interface also includes some capabilities that may not be required for reprogramming, but allows the interface to be used for other purposes without placing a significant burden on the interface manufacturers.

J2534-2

- SAE J2534-2 defines optional features that takes advantage of the J2534-1 framework.
- It allows the interface (J2534) to be used for other purposes and includes features that are above and beyond emission related reprogramming needs.
- Many OEM's wanted a standard for reprogramming other modules not "Emission Related". Those instructions were added into -2. It also expands the scope of what a J2534 device can do. (ie: Diagnostics)

J2534-3

- SAE J2534-3 defines a set of conformance test cases, which can be used to check an interface's compliance with SAE J2534-1
- Conformance test cases are planned for J2534-2 features also
- Some preliminary work has been done on the J2534-1 conformance test cases. No work has been initiated for the J2534-2 conformance test cases.
- There is no published standard yet.

General J2534 Framework

J2534 framework includes application interfaces for the following functionality:

- Network Initialization
- Basic Send and Receive
- Periodic Transmission Capability
- Message Filters
- Generic IO Control
- Protocol Specific IO Control
- Programming Voltage Supply
- Other Utility Functions

J2534-1 Basics (04-04)

- **Protocols Supported by a fully compliant SAE J2534-1 Device**
- J1850 VPW (GM Class2, Chrysler OBD)
- J1850 PWM (Ford SCP)
- High Speed CAN
- ISO 15765-4 (Diag. On CAN)
- ISO 14230 (KWP)
- ISO 9141-2
- Chrysler SCI

J2534-2 Basics

- **Additional Protocols Currently Supported by the SAE J2534-2 Specifications**
- SAE J1939
- SAE J1708
- Single Wire CAN
- GM UART
- UART Echo Byte
- Honda Diag-H
- TP 2.0
- Fault Tolerant CAN

J2534-2 Basics

- **Also Supported by the SAE J2534-2 Specifications**
- Extended IOCTL (Input/Output Controls) for Device Parameter Configuration
- Extended Programming Voltage Support
- Repeat Messaging (Repeated transmission until a certain condition is met)
- Simultaneous handling of ISO 15765 and Raw CAN protocol

J2534 Basic Framework (04-04)

- API Functions
  - **PassThruOpen**
  - **PassThruClose**
  - **PassThruConnect**
  - **PassThruDisconnect**
  - **PassThruReadMsgs**
  - **PassThruWriteMsgs**
  - **PassThruStartPeriodicMsg**
  - **PassThruStopPeriodicMsg**
  - **PassThruStartMsgFilter**
  - **PassThruStopMsgFilter**
  - **PassThruSetProgrammingVoltage**
  - **PassThruReadVersion**
  - **PassThruGetLasError**
  - **PassThruIoctl**

J2534 Basic Framework (04-04)

- **IOCTLS**
  - **GET_CONFIG**
  - **SET_CONFIG**
  - **READ_VBATT**
  - **FIVE_BAUD_INIT**
  - **FAST_INIT**
  - **CLEAR_TX_BUFFER**
  - **CLEAR_RX_BUFFER**
  - **CLEAR_PERIODIC_MSGS**
  - **CLEAR_MSG_FILTERS**
  - **CLEAR_FUNCT_MSG_LOOKUP_TABLE**
  - **DELETE_FROM_FUNCT_MSG_LOOKUP_TABLE**
  - **READ_PROG_VOLTAGE**

J2534 TF Current Work

- Changes to J2534-1 that include
  - Some non-backward compatible changes required for unambiguous conformance test specifications
  - Changes and clarifications related to error handling, ability to discover available devices etc.
  - Minor editorial changes
- Changes to J2534-2 that include
  - Modifications to reflect changes in J2534-1
  - Restructuring of the document to help in better maintenance

J2534-1 Framework Changes

New Functions added:

- **PassThruScanForDevices**
  - Search for all connected Pass-Thru Devices.
- **PassThruGetNextDevice**
  - Return the list of Pass-Thru Devices, which was created by the last call to PassThruScanForDevices.
- **PassThruGetDeviceContent**
  - Return the list of capabilities for the specified Pass-Thru Devices

These set of functions provides applications the ability to discover all available J2534 devices and choose to connect to. This feature will be especially useful in situations where multiple wireless devices are available.

J2534-1 Framework Changes

Logical Channel Support:

- **PassThruLogicalConnect**
  - Establish a logical channel over an existing physical connection.
- **PassThruLogicalDisconnect**
  - Terminate a logical channel over an existing physical connection.

These two functions have been added to support for all higher level segmented-transfer based protocols. In J2534-1 it mainly affects ISO 15765, which now will be a logical channel on a generic CAN protocol channel. This results in removal of flow control filters and also allows for coexistence of CAN and ISO15765 on the same channel.

J2534-1 Framework Changes

One function replaced:

- PassThruQueueMsgs
- **This replaces PassThruWriteMsgs**

This change essentially removes the support for blocking writes. The new function only guarantees that the message to be transmitted has been placed in the transmit queue.

To ensure the message has been physically transmitted the applications are required to request a TxDone while sending a message and monitor for TxDone indication

J2534-1 Other Changes

- **All baud rates not required for emission-related vehicle reprogramming have been moved to J2534-2**
- **Minimum buffer size requirement for each protocol has been specified**
- **The filter count has been increased to 10 per protocol**
- **A keep-alive mechanism has been added to detect device disconnection and proper handling by the applications**
- **Message termination has been clearly defined for each protocol**
- **Error handling has been clearly defined for each protocol, and re-prioritized by importance.**
- **A MsgHandle field has been added to message structure for applications to uniquely identify each message that is sent**

J2534-1 Other Changes

- **LINK_DOWN error indication has been added for devices to report unresponsive links**
- **Simultaneous messages receptions increased from 8 to 10 on ISO 15765 to be consistent with number of logical channels**
- **It is clarified that periodic messages have higher priority than normal transmit messages**
- **BUFFER_OVERFLOW error has been added to indicate that some messages have been lost**
- **FULL_DUPLEX flag is added to TxFlags to select half-duplex or full-duplex mode for ISO15765**
- **LOOPBACK functionality has been eliminated**

J2534-1 Other Changes

- **New IOCTL's**
  - **IOCTL ID CAN_BUS_ON is added in order to reinitialize the bus after it has gone BUS_OFF**
  - **IOCTL ID STOP_TRANMSIT to allow an application to terminate an active message transmission.**

J2534-1 Changes (v05-00)

- API Change Summery (14 to 19)
  - API Functions Added:
    - PassThruScanForDevice
    - PassThruGetNextDevice
    - PassThruGetDeviceContent
    - PassThruQueueMsgs
    - PassThruLogicalConnect
    - PassThruLogicalDisconnect
  - API Function Removed:
    - PassThruWriteMsgs

What do these changes mean?

- **There is a higher likelihood that the J2534-1 API implemented by various vendors will be similar with less room for interpretation**
- **It will be easier to write conformance test cases as most of the ambiguities have been removed**
- **The changes will result in the vendors and OEMs having to redevelop/modify their existing API implementations and application respectively**

J2534-2 Changes

- **All the changes being made to the J2534-1 framework will be reflected in the J2534-2 specification**
- **There is a proposal from the task force for the specification to be split into several individually ballotable documents. This will be presented at the next EE Diag. Meeting. During this restructuring all the section are being thoroughly reviewed and clarifications are being added**
- **Some features like "Simultaneous CAN" will become redundant due to the introduction of the logical channel concept and hence will be removed.**

Thank-you!

- Questions?