OBD Implementation in J1939

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Manager, Vehicle Requirements
International Truck and Engine Corporation
September 14, 2005
Topics

- Introduction
- Standards Development for HD OBD
- WWH OBD
Introduction

- Regulations
- Standards Development Organizations
- HD Industry Structure
- Prior Practices
# Existing and Planned OBD Regulations

<table>
<thead>
<tr>
<th>Term</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Title 40 CFR 86 … TBA</em></td>
</tr>
<tr>
<td>EURO III, IV, V</td>
<td>e.g. UNECE Regulation No. 83; Annex 11</td>
</tr>
<tr>
<td>OBD II</td>
<td>13 CCR 1968.2 (under biennial review)</td>
</tr>
<tr>
<td></td>
<td><em>Title 40 CFR 86.005-17 et. al.</em></td>
</tr>
<tr>
<td>WWH OBD</td>
<td>World Wide Harmonized On Board Diag.</td>
</tr>
</tbody>
</table>
## Standards Organization Overlap

<table>
<thead>
<tr>
<th>Vehicle Type/Standards Group</th>
<th>On Road</th>
<th>Off Road</th>
<th>Stationary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class 1-3</td>
<td>Class 4-8</td>
<td>Con/Ag</td>
</tr>
<tr>
<td>SAE MVC Datalink Comm.</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO On Road TC 22/SC3/WG1</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SAE T&amp;B Control &amp; Communication SC</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ISO Ag &amp; Forestry TC23/SC19</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
Introduction

- Regulations
- Standards Development Organizations
- HD Industry Structure
  - Market Size
  - Market Integration
  - Complexity Comparison
- Prior Practices
# NA Medium/Heavy Truck Market Size

<table>
<thead>
<tr>
<th>Weight Class</th>
<th>2000-2001 U.S. Avg. Retail Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>III - 10,001-14,000 lbs.</td>
<td>104,686</td>
</tr>
<tr>
<td>IV - 14,001-16,000 lbs.</td>
<td>49,727</td>
</tr>
<tr>
<td>V - 16,001-19,500 lbs.</td>
<td>26,763</td>
</tr>
<tr>
<td>VI - 19,501-26,000 lbs.</td>
<td>46,799</td>
</tr>
<tr>
<td>VII - 26,001-33,000 lbs.</td>
<td>107,089</td>
</tr>
<tr>
<td>VIII - 33,001 &amp; above lbs.</td>
<td>175,584</td>
</tr>
<tr>
<td><strong>Total Class IV &amp; above</strong></td>
<td><strong>405,962</strong></td>
</tr>
</tbody>
</table>
NA Horizontal Integration for HDD over 26K lbs (classes 7-8)
## Industry Complexity Comparison

<table>
<thead>
<tr>
<th>Attribute</th>
<th>HDD Vehicles</th>
<th>LD Vehicles</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume, NA</td>
<td>~500K</td>
<td>~15 M</td>
<td>30:1 ratio → increases amortized costs per unit</td>
</tr>
<tr>
<td>Eng./Xmsn offerings</td>
<td>Dozens / Model with reuse</td>
<td>&lt; 5 / Model with reuse</td>
<td>HD Models also drive variation through accessory and electrical system differences.</td>
</tr>
<tr>
<td>Final Drive offerings</td>
<td>Custom order from 2.64 to 7.17</td>
<td>&lt; 5 / Model with reuse</td>
<td>Vehicle content creates 100’s of HD Engine / Transmission / Vehicle combinations to validate.</td>
</tr>
<tr>
<td>Emissions Certification</td>
<td>Engine Dynamometer</td>
<td>Vehicle Dynamometer</td>
<td>HD emissions/diagnostics are developed independently of the vehicle</td>
</tr>
</tbody>
</table>

OBD Implementation in J-1939
Introduction

- Regulations
- Standards Development Organizations
- Industry Structure

Prior Practices

- Approaches
- LD/HD Approach Comparison
Communication Approaches

Polling Model
- Stimulus Response Behavior System to gather information.
- Increases tool communication demands for parametric data
- Permits fully optimized point to point communication
- Polling Model implemented in SAE J1978/SAE J1979

Broadcast Model
- Schedule of provided information available to all connected participants.
- Reduces tool communication demands for parametric data
- Presumes there is more than one user for many data items
- Presumes an architecture to develop a schedule of the public information.
- Fixed formats create empty space
- *NA HD Vehicles have used a broadcast model since 1988*
### LD/HD Approach Comparison

<table>
<thead>
<tr>
<th>Data Link Function</th>
<th>LD Approach</th>
<th>NA HD Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Parametric Data</td>
<td>ISO 15031-5 Annex B</td>
<td>SAE J 1939-71</td>
</tr>
<tr>
<td>- Emissions Related</td>
<td>Mode x01 PID x03 – x1B</td>
<td>Standard Broadcasts</td>
</tr>
<tr>
<td>- Not Emissions Related</td>
<td>Enhanced/Proprietary</td>
<td>Standard Broadcasts</td>
</tr>
<tr>
<td>Confirmed/pending</td>
<td>Mode x03/Mode x07</td>
<td>DM12/DM6</td>
</tr>
<tr>
<td>MIL Status</td>
<td>Polled, Mode x01</td>
<td>Broadcast (DM1)</td>
</tr>
<tr>
<td>Data Labels</td>
<td>PID in Wrapper</td>
<td>Embedded in PDU</td>
</tr>
<tr>
<td>Normal Mode Messages</td>
<td>Proprietary</td>
<td>Standard Broadcasts</td>
</tr>
<tr>
<td>Service Bay Tests</td>
<td>Mode x08, Enhanced/Proprietary</td>
<td>DM7, Proprietary</td>
</tr>
<tr>
<td>Diagnostic Codes</td>
<td>Pxxx SAE J 2012/ISO 15031-6</td>
<td>SAE J 1939-73, Signal Name+Failure Mode</td>
</tr>
</tbody>
</table>
Standards Development for HD OBD

- Existing OBD Features in J 1939
- Adopted Protocols for HD OBD
- Regulation Standardization Needs
- Standards updates to meet 13 CCR 1971.1
- J 1939 Document Structure and Application
Standards Development for HD OBD

- Existing OBD Features in J 1939
  - Application Layer Summary
  - OBD Features in J 1939-73
  - OBD Feature Mapping from Light Duty
  - OBD II Messages in J 1939
  - Diagnostic Trouble Code Structure
  - DTC Process Models

- Adopted Protocols for HD OBD
- Regulation Standardization Needs
- Standards updates to meet 13 CCR 1971.1
- J 1939 Document Structure and Application
J 1939 Application Layer Summary

- Control (XMSN, ABS, ATC) … J 1939-71
  - Engine/Retarder Torque/Speed Control [TSC1]

- Engine Properties … J 1939-71
  - Torque Map

- Multiplexing (IC, Operator Controls)… J 1939-71
  - Boost (MAP), Coolant Temp, Vehicle Speed, Engine Speed
  - Cruise Control, Brake Application

- Diagnostic Services … J 1939-73
  - Fault Code Read/Clear
  - MIL Status, Readiness

- Memory Access … J 1939-73
  - Secure, Namespace Labeled read/write
# OBD Features in J 1939

<table>
<thead>
<tr>
<th>OBD II Requirements</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBD II Implementation in J-1939</td>
<td></td>
</tr>
<tr>
<td>Diagnostic Monitoring Algorithms</td>
<td>OBD II Reg.</td>
</tr>
<tr>
<td>Diagnostic Services</td>
<td>J1979, J1939-73</td>
</tr>
<tr>
<td>Diagnostic Trouble Codes</td>
<td>J2012</td>
</tr>
<tr>
<td>Monitoring Parameter</td>
<td>J1979</td>
</tr>
<tr>
<td>Diagnostic Lamps</td>
<td>OBD II Reg.</td>
</tr>
<tr>
<td>Diagnostic Off-Board Connector</td>
<td>J1962</td>
</tr>
<tr>
<td>Data Link: Electrical, Message Formatting, Addressing</td>
<td>ISO 15764-4, J1850, ISO 9141–2</td>
</tr>
<tr>
<td>Scan Tool Requirements</td>
<td>J1978</td>
</tr>
<tr>
<td>Pass through programming</td>
<td>J2534</td>
</tr>
<tr>
<td>Service Documentation Format</td>
<td>J2008</td>
</tr>
<tr>
<td>Terms / Definitions / Acronyms</td>
<td>J1930</td>
</tr>
</tbody>
</table>
## J1939-73 Feature Mapping

<table>
<thead>
<tr>
<th>Diagnostic Services</th>
<th>LD &amp; MD</th>
<th>HD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitored Parameters</td>
<td>Mode 1</td>
<td>J1939-71</td>
</tr>
<tr>
<td>Diagnostic Readiness</td>
<td>Mode 1</td>
<td>DM5</td>
</tr>
<tr>
<td>Lamp Status</td>
<td>Mode 1</td>
<td>DM1, DM2, DM12</td>
</tr>
<tr>
<td>Freeze Frame</td>
<td>Mode 2</td>
<td>DM4</td>
</tr>
<tr>
<td>Report DTCs (A, PA, EA)</td>
<td>Mode 3</td>
<td>DM1&lt;sub&gt; Broadcast&lt;/sub&gt; (A), DM2 (PA), DM12 (EA)</td>
</tr>
<tr>
<td>Clear Diagnostic Information</td>
<td>Mode 4</td>
<td>DM3(PA), DM11(A)</td>
</tr>
<tr>
<td>Report O&lt;sub&gt;2&lt;/sub&gt; Sensor Test Results</td>
<td>Mode 5</td>
<td>DM8</td>
</tr>
<tr>
<td>Request Test ID Support</td>
<td>Mode 6</td>
<td>DM10</td>
</tr>
<tr>
<td>Request Test Results</td>
<td>Mode 6</td>
<td>DM7</td>
</tr>
<tr>
<td>Report Test Results: Continuous Non-continuous</td>
<td>Mode 7</td>
<td>DM6</td>
</tr>
<tr>
<td></td>
<td>Mode 6</td>
<td>DM8</td>
</tr>
<tr>
<td>Request control of system, test or component</td>
<td>Mode 8</td>
<td>DM7 Request Test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DM8 Report Results</td>
</tr>
<tr>
<td>Report VIN, CID, and CVN</td>
<td>Mode 9</td>
<td>PGN 65260 and DM19</td>
</tr>
</tbody>
</table>
### J1939 Messages for OBD II

<table>
<thead>
<tr>
<th>PGN Description</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM1</td>
<td>Active DTCs</td>
</tr>
<tr>
<td>DM12</td>
<td>Emission Related Active DTCs</td>
</tr>
<tr>
<td>DM11, DM3</td>
<td>Clear diagnostic trouble codes</td>
</tr>
<tr>
<td>DM4</td>
<td>Freeze Frame</td>
</tr>
<tr>
<td>DM5</td>
<td>Diagnostic Readiness</td>
</tr>
<tr>
<td>DM6</td>
<td>Continuous Monitor Test Results</td>
</tr>
<tr>
<td>DM7</td>
<td>Command Test</td>
</tr>
<tr>
<td>DM8</td>
<td>Report Test Results</td>
</tr>
<tr>
<td>DM10</td>
<td>Test Identifiers Supported</td>
</tr>
<tr>
<td>DM19</td>
<td>Calibration Information</td>
</tr>
<tr>
<td>65260</td>
<td>VIN</td>
</tr>
<tr>
<td>65262</td>
<td>Engine Temperatures</td>
</tr>
<tr>
<td></td>
<td>Engine Coolant Temperature</td>
</tr>
<tr>
<td>65265</td>
<td>Cruise Control/Vehicle Speed</td>
</tr>
<tr>
<td></td>
<td>MPH</td>
</tr>
<tr>
<td>65270</td>
<td>Inlet/Exhaust Conditions</td>
</tr>
<tr>
<td></td>
<td>Boost Pressure, Intake Manifold Temperature</td>
</tr>
<tr>
<td>61443</td>
<td>Electronic Engine Controller #2</td>
</tr>
<tr>
<td></td>
<td>Accelerator Pedal Position, % Load at Current Speed</td>
</tr>
<tr>
<td>61444</td>
<td>Electronic Engine Controller #1</td>
</tr>
<tr>
<td></td>
<td>Actual Engine % Torque, RPM</td>
</tr>
<tr>
<td>65159</td>
<td>Ignition Timing</td>
</tr>
<tr>
<td></td>
<td>Actual Ignition Timing</td>
</tr>
<tr>
<td>59392</td>
<td>Acknowledgement Message</td>
</tr>
<tr>
<td>59904</td>
<td>Request PGN</td>
</tr>
<tr>
<td>60416</td>
<td>Transport Protocol–Connection Mgmt</td>
</tr>
<tr>
<td>60160</td>
<td>Transport Protocol–Data Transfer</td>
</tr>
</tbody>
</table>
DTC Structure SPN+FMI+OC

Who? e.g. engine

Source Address

0..255

What? e.g. accelerator pedal sensor?

_SPN_

How did the signal / component fail? e.g. open circuit

FMI

0..31

How many times has this failure happened?

OC

0..127

OBD Implementation in J-1939
J1939 Active/Previously Active Model

0) Start
   - Diagnostic Condition not previously detected
   - No Reporting Required
   - Diagnostic Condition Previously Detected

1) Waiting to satisfy entry criteria
   - Lamp OFF
   - Diagnostic Routine Entry Conditions Satisfied
   - Diagnostic Condition NOT Discovered

2) Diagnostic Method Executing
   - Repetitive Diagnostic Routine Entry Conditions Satisfied
   - IGN turns OFF

3) Active Fault Discovered, lamp ON
   - Repetitive Diagnostic Routine Entry Conditions Satisfied

4) Diagnostic Method Executing
   - Diagnostic Condition Discovered
   - Diagnostic Condition NOT Discovered

5) Active Fault Housekeeping
   - IGN turns OFF
   - Report Active Faults with DM1, and turn MIL Lamp ON, Increment Detection Count for each detection

6) Diagnostic Method Executing
   - Diagnostic Routine Entry Conditions Satisfied
   - IGN turns OFF

7) Waiting to satisfy entry criteria
   - Lamp OFF

8) Inactive fault housekeeping
   - Manufacturer defined, inactive fault housekeeping may eventually erase the inactive fault

When a diagnostic condition is no longer detected, it should be removed from the active (DM1) list and reported using the inactive (DM2) list.

OBD Implementation in J-1939
Initial Model for OBD II Faults in J1939

- **MIL State Unknown**
  - **Fault Condition is Pending**
  - **Pending Condition Awaiting Confirmation**
  - **Pending Fault Completion and No Fault Detected**
  - **Monitor Entry Conditions Satisfied**
  - **Monitor Entry Conditions Not Satisfied**
  - **Monitor Complete and fault detected**
  - **Monitor Running**

- **MIL Countdown**
  - **MIL Countdown > 0**
  - **MIL Countdown <= 0**

- **Fault Condition**
  - **Pending Fault Conditions**
  - **Confirmed Fault Conditions**
  - **Pending/Confirmed Faults with MIL ON**
  - **Active, Confirmed Fault Conditions**
  - **Inactive, Confirmed Fault Conditions**

- **Decrement**
  - **Warm-up Countdown**
  - **Countdown <= 0**

- **Active, Confirmed Fault Conditions**
  - **MIL Countdown > 0**
  - **MIL Countdown <= 0**

- **MIL State**
  - **Turn MIL OFF**
  - **MIL Countdown**

- **Decision Checks**
  - **Confirmed Condition Requires MIL ON**
  - **Confirmed Condition Alters MIL Off**
  - **Monitor Entry Conditions Satisfied**
  - **Monitor Entry Conditions Not Satisfied**

- **Conditions**
  - **Inactive, Confirmed Fault conditions with MIL ON end here**
  - **Inactive, Confirmed Fault Conditions that require the MIL ON end here**
  - **Inactive, Confirmed Fault Conditions that do NOT require the MIL ON end here**

- **Re-enter Continuous Monitor**
  - **(d)(2.2)**

- **MIL is Turned ON**
  - **MIL Countdown is set to 3**, Warmup Cycle countdown is assumed to be <= 0 for pending faults.

- **November 19, 2003**
  - Eric T. Swenson
Standards Development for HD OBD

- Existing OBD Features in J1939
- Adopted Protocols
- Regulation Standardization Needs
  - New Requirements in 13 CCR 1971.1 HD OBD
  - From Active/Previously Active to Pending, Confirmed, Permanent
- Standards updates to meet 13 CCR 1971.1
- J1939 Document Structure and Application
Adopted Approaches for HD OBD

- Implementation for 13 CCR 1971.1 may use
  - ISO 15765-4, ISO 15031-4 et. al.
  - SAE J1939-73, et. al. or

- Both are also permitted in Euro III, IV, V

- J1939 is also recognized by US EPA for HD
New Requirements in HD OBD

- Diesel Monitor Readiness
  - New elements for PM, SCR, NOx Catalysts
  - “This driving cycle” readiness (new for 13 CCR 1968.2)

- DTC Message Architecture
  - Permanent Faults – new service
  - Pending/Confirmed vs. Directions for active/inactive DTCs

- NTE Zone
  - Indication of exceptional operating conditions

- Engine Hours, Idle Time, PTO Time
  - 3 min per bit (0.05 hr/bit) proposed to regulators
Standards Development for HD OBD

- Existing OBD Features in J 1939
- Adopted Protocols
- Regulation Standardization Needs
- Standards updates to meet 13 CCR 1971.1
  - New Communication Content
  - Existing Communication Content
- J 1939 Document Structure and Application
HD OBD-driven Updates J 1939 et.al.

- J 1939
  - Reference changes for new versions
- J 1939-03 Implementation Guide for HD OBD on J 1939 (New)
  - Provides a vehicle context for HD OBD
    - Summarizes key datalink requirements supporting HD OBD
    - Provides conventions for multiplexed controls and outputs
  - Models IM process based on the ETI process for J 1979
- J 1939-84 OBD Scan Tool Compliance (New)
  - Leverages J 1699-3 process and adapts it for J 1939-73.
- J 1939-73 Application Layer – Diagnostics (Revised)
  - New diagnostics data and services to match regulation provisions
Standards Development for HD OBD

- Existing OBD Features in J1939
- Adopted Protocols
- Regulation Standardization Needs
- Standards updates to meet 13 CCR 1971.1
- J1939 Document Structure and Application
J 1939 Document Structure & Application

The T&B Communication and Control SC believe the following standards support HD OBD regulations. New and revisions noted.

- **J 1939 (Revised, document reference set)**
  - Document references, Industry Groups, SPN list, Function Names, Manufacturer Identifications
  - *A new publication date will be needed for (h)(1.8)*
- **J 1939-03 Implementation Guide for HD OBD on J 1939 (NEW)**
  - Key requirements for Scan Tool Interoperability
  - Model IM process
- **J 1939-13 Diagnostic Connector**
- **J 1939-21 Datalink Layer**
  - PDU Structure (use of CAN frame control fields)
  - Transport Protocol TP_CM, TP_BAM
  - Request / Acknowledgement
J1939 Document Structure - 2

- J1939-71 Application Layer (Updated Quarterly)
  - Engine Operating Conditions - Broadcast Messages
  - “Normal Mode” PGN, SPN Data Dictionary
- J1939-73 Application Layer – Diagnostics (Revised)
  - Diagnostic Messages
  - Data Dictionary for OBD Communications
- J1939-81 Network Management
  - Address Claim (Name)
    - Physical Address Management and Function Identification
- J1939-84 HD OBD Scan Tool Compliance (New)
  - Leverages J1699-3 process and adapts it for J1939-73.
WWH OBD

World Wide Harmonized On Board Diagnostics

- Global Regulatory Framework
- GTR Proposal
- WWH OBD Problem
- Existing Proposal
UN/ECE/ WP29 World Forum for Harmonization of Vehicle Regulations

1958 Agreement → Regulation → GTR

Political-Decisions

- WP29 3 meetings per year
- GRs normally 2 meetings per year

GRE

GRPE

GRRF

GRSG

GRSP

Noise

Lighting

Pollution & Energy

Brakes and running gear

General safety

Passive safety

Governments

NGO

Mostly all meetings in Geneva

UN/ECE/WP29 World Forum for Harmonization of Vehicle Regulations
Initiation of Global Technical Regulation

- Article 6.3 of the 1998 Global Agreement.
- Develop a harmonized OBD system for light-duty vehicles, heavy-duty vehicles, or both
- Direct emission measurement may be an important technology to achieve diesel engine closed-loop feedback
- Monitor emission related power train components to assure that malfunctions, which would cause emissions to exceed standards by a specified amount are detected, and the vehicle operator is alerted to the need for maintenance or repair.

Source: Informal document No. 13 (125th WP.29, 6-9 November 2001, agenda items A.6.2. and B.2.2.)
WWH OBD

World Wide Harmonized On Board Diagnostics

- Global Regulatory Framework
- GTR Proposal
- WWH OBD Problem
- Existing Proposal
WWH OBD Problem

Test Tool Technology

SAE Implementation in J-1939

Manufacturer Specific

Vehicle Technology

SAE ISO

Vehicle Protocol Independence

New ISO document(s)

Industry Standard Wireless Communication

Diagnostic Tester

OBD Application

Flash Prog. Application

Conformance Test Application

SAE J1939-71

ISO 15031-5/-6

SAE J1939

TTG

ECM

TCM

GW

TCU

ISO 15765

BCM

ECM

...

Manufacturer Specific

...

...

OBD Implementation in J-1939

Industry Standard Wireless Communication

Vehicle Manufacturer

Tester Supplier

WWH OBD

Diagnostic Tester

OBD Data

Enh. Diag. Application

Vehicle Technology

SAE ISO

Vehicle Protocol Independence

Industry Standard Wireless Communication

Diagnostic Tester

OBD Application

Flash Prog. Application

Conformance Test Application

SAE J1939-71

ISO 15031-5/-6

SAE J1939

TTG

ECM

TCM

GW

TCU

ISO 15765

BCM

ECM

...

Manufacturer Specific

...

...

OBD Implementation in J-1939
Emissions-related UDS on TCP/IP on Ethernet (IEEE 802.3 CSMA/CD) or WLAN (IEEE 802.11)

Note UDS [Universal Diagnostic Services] refers to DIS 14229 et al
Adapted from Ralf Heistert - DSA, Gangolf Feiter - GM SPO 7/04
WWH-OBD UDS-Server

TCP/IP Gateway ECU Alt. #5

Tester

Normal Comm. | OBD Comm.
---|---
OEM Specific (Application) | UDS (Application)
OEM Specific (Presentation) | UDS (Presentation)
OEM Specific (Session) | UDS (Session)

ISO 11898-2
ISO 11898-3
ISO 11898-4
FlexRay, MOST, LIN, TTP, other (Data Link Layer)

ISO 11898-2
ISO 11898-3
ISO 11898-4
FlexRay, MOST, LIN, TTP, other (Physical Layer)

UDS Gateway

ISO 11898-2
ISO 11898-3
ISO 11898-4
FlexRay, MOST, LIN, TTP, other (Data Link Layer)

TCP (Transport)
IP (Network)
DLL (Data Link Layer)
ETH (Physical Layer)

UDS Application
UDS (Presentation)
UDS (Session)
TCP (Transport)
IP (Network)
DLL (Data Link Layer)
ETH (Physical Layer)

Adapted from Ralf Heistert - DSA, Gangolf Feiter - GM SPO 7/04

OBD Implementation in J-1939
**WWH-OBD UDS-Server**

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**ECU**
- Normal Comm.: J1939-71 (Application)
- OBD Comm.: ISO 15031 (Application)
- J1939-71 (Presentation)
  - ISO 15031 (Presentation)
- J1939-71 (Session)
  - ISO 15031 (Session)
- ISO 11898-3,4,5 SAE J1939-11 (Physical Layer)

**TCP/IP Gateway ECU Alt. #3**
- ISO 15031 (Session Layer)
- ISO 15765-3 SAE J1939-21 (Data Link Layer)
- ISO 11898-3,4,5 SAE J1939-11 (Physical Layer)
- UDS / ISO 15031 Gateway
  - Message Conversion
  - Data Conversion
  - Session Management

**Tester**
- OBD Comm.:
  - UDS Application
  - UDS (Presentation)
  - TCP (Transport)
  - IP (Network)
  - DLL (Data Link Layer)
  - ETH (Physical Layer)

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Adapted from Ralf Heistert - DSA, Gangolf Feiter - GM SPO 7/04

OBD Implementation in J-1939
WWH OBD

World Wide Harmonized On Board Diagnostics

- Global Regulatory Framework
- GTR Proposal
- WWH OBD Problem
- Existing Proposal
ISO New Work Item Proposal

The ISO Ad-Hoc task force defined a ‘New Work Item Proposal’ for an ISO Standard for WWH OBD.

NWIP was submitted to TC22/SC3/WG1 (4/8/05).

Road vehicles - On board diagnostics (WWH-OBD) implementation

- Part 1 - General Information and use case definitions
- Part 2 - Common emissions-related data dictionary
- Part 3 - Common message dictionary
- Part 4 - Wired connection
- Part 5 - Wireless connection
- Part 6 - Conformance test

See Document: W161_ISO_WWH_NWIP_4-7-05.rtf
Source WWH WG1 Report Berlin April 7th 2005
Current Status of Work

- ‘Skeleton’ documents for Parts 1, 2, and 3 started
- A close relationship has been formed with the SAE DSRC group to monitor the progress of their work which will be crucial to the Part 5 development.
  - Proposals for wireless applications were forwarded in January
  - Part 5 will follow work on parts 1, 2, and 3.

Source: WWH WG1 Report Berlin April 7th 2005
Current Issues

- The group has been working to resolve several concerns that it has not been possible to reach consensus on at this time.
  
1. The selection of the addressing (many vs. fixed set of CAN ID’s) to be used by the Tester and ECU’s for WWH OBD?

2. Development of a single data set (DTC’s DPI D’s/PGN’s etc.) for WWH OBD. Recommendation is a ‘Blank Sheet Approach’ to best serve the ‘Technician’ in fixing the vehicle in the future.

3. Selection and implementation of a Transport Network Protocol. Should the work focus around support of UDS services on a SAE J 1939 network with additional SAE J 1939 CAN ID’s already reserved and utilising ISO 15765-2 Transport Protocol. Or should the work focus on using the SAE J 1939 transport protocol as is.

Notes:

- A subsequent TC22/SC3/WG1 resolution directed sole use of ISO 15765-3 to resolve these issues.

- It is recommended that the data item enumeration uses the same identifier for a parametric data item and to prefix its associated failure modes.

Source WWH WG1 Report Berlin April 7th 2005
Questions?