INTERFACE CONTROL DOCUMENT

Version 1.0.1

for the

NYS CVII DSRC Message Set

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REVISION NOTICE

Version Identifier	Date of Issue	Summary of Changes
1.0.0	12/9/2011	Initial version

1. SCOPE

1.1 Project Identification

This document serves as the Interface Control Document for the NYS CVII DSRC Message Set and is based on SAE J2735 Rev 36.

1.2 System Overview

The DMCU serves as an interface to communicate with Dedicated Short Range Communication (DSRC) equipped systems such as Road-Side Equipment (RSE) and On-board Equipment (OBE) in other vehicles. It interfaces with the Global Positioning System (GPS) and other vehicle systems on the OBU. This document describes the message set used on the 5.9 GHz DSRC interface between Mercury and other DSRC devices. This DSRC interface supports the WAVE protocol. These interfaces are shown in Figure 1.

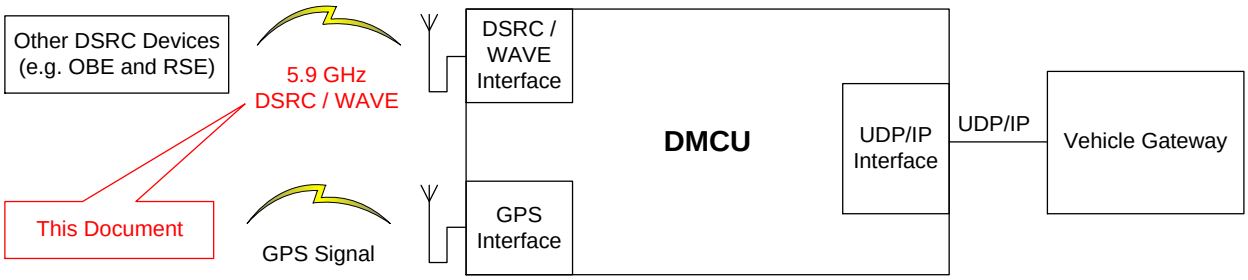

Figure 1. Overview of DMCU Interfaces

1.3 Goals and Objectives

The DMCU has the following goals and objectives:

- Interface with various GPS provider applications for positional data
- Interface with the Wireless Access in Vehicular Environment (WAVE) Software Development Kit to communicate with other DSRC devices
- Interface with other On-Board vehicle systems via UDP/IP
- Provide Probe Data Collection and dissemination capabilities
- Provide Traveler Advisory Message capabilities
- Provide encoding and decoding capabilities for Society of Automotive Engineers (SAE) J2735 based messages
- Provide Driver Credentials Verification capabilities
- Provide Wireless Roadside Inspection capabilities
- Provide Emergency Vehicle Alert (EVA) generation and processing capabilities

1.4 Document Overview

The details of this interface are described in Section 2. Acronyms are included in Appendix A.

1.5 Related Documents

The following documents are related to or are referenced within this document.

- *VII Proof-of-Concept DSRC Message Sets*, SAE
- *J2735 DSRC Message Set Dictionary (R36)*, SAE

2. INTERFACE

The NYS CVII DSRC message set is defined in the following paragraphs.

2.1 Probe Vehicle Data and Traveler Information

This message set utilizes the messages, frames, and elements defined in the *VII Proof-of-Concept DSRC Message Sets* for Probe Vehicle Data and Traveler Information. This older J2735 based message set was used to provide compatibility with existing NYS back office systems created during the VII Proof-of-Concept.

2.2 Emergency Vehicle Alert

This message set utilizes the messages, frames, and elements defined in the *J2735 DSRC Message Set Dictionary (R36)* for Emergency Vehicle Alert.

2.3 Driver Credentials and Wireless Roadside Inspection

This message set adds the new messages, frames, and elements defined in Paragraph 3 for Driver Credentials and Wireless Roadside Inspection. These additions are required to support new commercial vehicle functionality not currently supported by J2735.

3. CVII MESSAGE SET DICTIONARY ADDITIONS

The new messages, frames, and elements defined in this paragraph were designed to be consistent with existing definitions in *J2735 DSRC Message Set Dictionary (R36)* to the greatest degree practical and to utilize existing J2735 elements where possible.

```
-- DE_DSRC_MessageID (Desc Name) Record 37
DSRCmsgID ::= ENUMERATED {
   reserved                         (0),
   alaCarteMessage                  (1),  -- ACM
   basicSafetyMessage               (2),  -- BSM, heartbeat msg
   basicSafetyMessageVerbose        (3),  -- used for testing only
   commonSafetyRequest              (4),  -- CSR
   emergencyVehicleAlert            (5),  -- EVA
   intersectionCollisionAlert       (6),  -- ICA
   mapData                          (7),  -- MAP, GID, intersections
   nmeaCorrections                  (8),  -- NMEA
   probeDataManagement              (9),  -- PDM
   probeVehicleData                 (10), -- PVD
   roadSideAlert                    (11), -- RSA
   rtcmCorrections                  (12), -- RTCM
   signalPhaseAndTimingMessage      (13), -- SPAT
   signalRequestMessage             (14), -- SRM
   signalStatusMessage              (15), -- SSM
   travelerInformation              (16), -- TIM

   -- # LOCAL_CONTENT

   wriMessage                        (128), -- WRI
   driverCredentialMessage                (129) -- CDL

   }
   -- values to 127 reserved for std use
   -- values 128 to 255 reserved for local use



-- LOCAL DEFINITIONS FOR CVII

WRIMessage ::= SEQUENCE {
        msgID        DSRCmsgID,
        wri          CHOICE {
                regionsMessage     WRIRegions, -- from RSE, broadcasts inspection
                                               -- and status regions
                statusMessage      WRIStatus, -- from vehicle,
                                              -- contains inspection information
                advisoryRequest    WRIAdvisoryRequest, -- from vehicle,
                                                       -- requests inspection status
                advisoryStatus     WRIAdvisoryStatus -- from RSE, pass/fail status
                                                     -- of vehicle inspection
                }
        }

DriverCredentialMessage ::= SEQUENCE {
        msgID            DSRCmsgID,
        credentials      CHOICE {
                driverCredential       DriverCredential,
                credentialStatus       DriverCredentialStatus
```

```
                }
        }

-- Defines the region where the vehicle sends its inspection data to the RSE
-- and the region where the vehicle should request its inspection response
WRIRegions ::= SEQUENCE {
        inspectionRegion      ValidRegion,
        advisoryRegion        ValidRegion
        }

-- Inspection data sent from the vehicle to the RSE
WRIStatus ::= SEQUENCE {
        tractor     TractorInformation,
        trailers    SEQUENCE SIZE(0..3) OF TrailerInformation,
        cdl             CDLContent,
        position    FullPositionVector
        }

WRIAdvisoryRequest ::= SEQUENCE {
        vin         VINstring, -- VIN of the tractor
        position    FullPositionVector
        }

-- Inspection response sent from the RSE to the vehicle
WRIAdvisoryStatus ::= SEQUENCE {
        vin         VINstring, -- VIN of the tractor
        status      InspectionStatus,
        region      ValidRegion,
        startTime   MinuteOfTheYear,
    duratonTime MinutesDuration,
        advise SEQUENCE (SIZE (1..3)) OF ITIS.ITIScodesAndText
        }

-- Sent from the vehicle to the RSE
DriverCredential ::= SEQUENCE {
        cdl     CDLContent
        }

-- Sent from the RSE to the vehicle in response to DriverCredentialMessage
DriverCredentialStatus ::= SEQUENCE {
        status   CredentialStatus
        }

CDLContent ::= SEQUENCE {
        license         DriversLicenseNumber,
        issuingState    State,
        issuingCountry   Country,
        issueDate       DDate,
        expDate         DDate,
        class           LicenseClass,
        name            DriversName,
        dateOfBirth     DDate,
        address         StreetAddress
        }

TractorInformation ::= SEQUENCE {
        vin        VINstring,
        tires      TireInformation,
        brakes     BrakeInformation,
        seatBelt   SeatBeltStatus,
        lights     LightingStatus,
```

```
        weight     WeightInformation
        }

TrailerInformation ::= SEQUENCE {
        position           TrailerLocation,
        vin                VINstring,
        tires              TireInformation,
        brakes             BrakeInformation,
        lights             LightingStatus,
        weight             WeightInformation
        }

-- 0 denotes first trailer, increments for each additional trailer
TrailerLocation ::= INTEGER (0..255)

SeatBeltStatus ::= ENUMERATED {
        notBuckled          (0),
        ok                  (1),
        error               (2),
        notAvailable        (3)
}

BrakeInformation ::= SEQUENCE {
        brakes   SEQUENCE SIZE(0..127) OF BrakeInspectionStatus
        }

WeightInformation ::= SEQUENCE {
        weight   SEQUENCE SIZE(0..15) OF WeightItem
        }

TireInformation ::= SEQUENCE {
        tires    SEQUENCE SIZE(0..255) OF TirePressureTemp
        }

WeightItem ::= SEQUENCE {
        axleGroupId         AxleGroupId,
        axleGroupWeight     AxleGroupWeight
        }

-- reused from J1939, enumeration (SPN 4073)
AxleGroupId ::= ENUMERATED {
        reserved1                    (0),
        steerAxle                    (1),
        liftAxleGroup                (2),
        driveAxleGroup               (3),
        tagAxleGroup                 (4),
        additionalTractorAxleGroup   (5),
        trailerAxleGroupA            (6),
        trailerAxleGroupB            (7),
        trailerAxleGroupC            (8),
        trailerAxleGroupD            (9),
        trailerAxleGroupE            (10),
        trailerAxleGroupF            (11),
        trailerAxleGroupG            (12),
        trailerAxleGroupH            (13),
        additionalTrailerAxleGroup   (14),
        reserved2                    (15)
        }

-- reused from J1939, 2kg/bit, 0 to 128,510kg (SPN 409)
AxleGroupWeight ::= INTEGER (0..65535)
```

```
BrakeInspectionStatus ::= SEQUENCE {
        axle      AxleLocation, -- low order 4 bits represent left to right position
                                -- high order 4 bits represent front to back position
        abs       AntiLockBrakeStatus,
        stroke    BrakeStroke,
        lining    BrakeLining
        }

-- reused from J1939 (SPN 3785 - 3804)
BrakeStroke ::= ENUMERATED {
        ok               (0),
        non-functioning  (1),
        over-stroke      (2),
        draggingBrake    (3),
        reserved1        (4),
        reserved2        (5),
        sensorError      (6),
        notAvailable     (7)
        }

-- 0-200 used for data (0-100%)
-- value of 255 reserved for unavailable
BrakeLining ::= INTEGER (0..255)

TirePressureTemp ::= SEQUENCE {
        location       TireLocation, -- low order 4 bits represent left to right
                                     -- position, high order 4 bits represent
                                     -- front to back position
        pressure       TirePressure,
        temperature    TireTemp
        }

LightingStatus ::= ENUMERATED {
        allLightsFunctioning     (0),
        oneOrMoreLightsFailed    (1)
        }

DriversLicenseNumber ::= OCTET STRING (SIZE(1..19))

-- i.e. Texas: TX, New York: NY, North Carolina: NC
-- Official USPS Code
State ::= OCTET STRING (SIZE(2))

-- i.e. United States: US, Mexico: MX, Canada: CA
-- ISO 3166
Country ::= OCTET STRING (SIZE(2))

LicenseClass ::= ENUMERATED {
        a    (0),
        b    (1),
        c    (2)
        }

DriversName ::= OCTET STRING (SIZE(1..128)) -- prefix first middle last suffix

StreetAddress ::= SEQUENCE {
        addressline1    OCTET STRING (SIZE(1..26)),
        addressLine2    OCTET STRING (SIZE(1..26)),
        city            OCTET STRING (SIZE(1..26)),
        state           State,
```

```
        zip             OCTET STRING (SIZE(5..10)), -- 5 digits or
                                                    -- 5 digits + "-" + 4 digits
        country         Country
        }

CredentialStatus ::= ENUMERATED {
        unavailable                 (0),
        licenseValid                (1),
        licenseExpired              (2),
        licenseRevoked              (3),
        medicalCertificateExpired   (4)
        }

InspectionStatus ::= ENUMERATED {
        pass (0),
        fail (1)
        }

-- end of CVII local content
```

APPENDIX A

Glossary, Terms, and Acronyms

Acronym	Definition
CVII	Commercial Vehicle Infrastructure Integration
DMCU	DSRC Mobile Communications Unit
DSRC	Dedicated Short Range Communication
EVA	Emergency Vehicle Alert
GPS	Global Positioning System
ICD	Interface Control Document
IP	Internet Protocol
NYS	New York State
OBU	On-Board Unit
OBE	On-Board Equipment
RSE	Road-Side Equipment
SAE	Society of Automotive Engineers
SwRI	Southwest Research Institute
UDP	User Datagram Protocol
VII	Vehicle Infrastructure Integration
WAVE	Wireless Access in Vehicular Environment