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# Potential Use of Continuously-Connected Remote OBD in CARB's Heavy-Duty Inspection and Maintenance (HD I/M) Program

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HD I/M Workgroup Meeting
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## Outline

- Background
  - HD I/M program development at a glance
  - Role of OBD in HD I/M
- Benefits of using Continuously Connected (CC)-Remote OBD in HD I/M
- Key envisioned tasks of CC-Remote OBD system in HD I/M
- Next steps
- Suggested discussion topics
- Open discussion

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# HD I/M Program Development at a Glance

- Senate Bill 210 (Leyva; Statutes of 2019) directs CARB to develop/implement a comprehensive HD I/M program
- Public workshops and HD I/M workgroup meetings will continue throughout program development
- HD I/M workgroup is an ongoing forum to discuss key technical and programmatic components
  - Purpose of today's webinar: convene an OBD sub-committee to discuss and advise CARB on key functionalities for remote telematic OBD data collection and submission
- Board hearing: expected in December 2021
- Implementation: expected to start in 2023

# Role of OBD in HD I/M

- OBD-equipped vehicles required to submit data at least every ~90 days:
  - Diesel engines MY 2013 and newer above 14,000 GVWR
  - Hybrid and Alt fuel engines MY 2018 and newer above 14,000 GVWR
- Collect OBD data using applicable protocol (SAE J1939, SAE J1979, UDS)
- Passing criteria for OBD data submissions:
  - No active fault codes, no permanent codes
- Testing options:
  - Continuously-connected: Original equipment manufacturer (OEM) and third-party telematics
  - Non continuously-connected:
    i. Third-party locations: e.g. dongles, kiosks located at truck stops and/or rest areas
    ii. Contractor in-person scans

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# Benefits of Using CC-Remote OBD in HD I/M

- Using existing OEM or third-party telematics services to demonstrate compliance
  - A growing number of heavy-duty vehicles use telematics to meet Electronic Logging Device (ELD) requirements and for fleet logistics management
- Reduced unnecessary downtime (making appointment, driving to test stations, etc.)
- Fully automatic with no human intervention and testing downtime
- Substantially lower program implementation costs for the state
- Earlier detection of emissions-related malfunctions expected to result in more timely maintenance, hence reduced costs and improved environmental protection

# CARB's Concept for Using CC-Remote OBD in HD I/M

vendor database

CARB-required OBD data

CC-Remote OBD device

CARB HD I/M database

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# Key Envisioned Tasks of CC-Remote OBD System in HD I/M

1. Establish connection with the vehicle and confirm vehicle's support of HD OBD
2. Identify when full OBD data submission to the HD I/M database should occur (continuously connected, not continuously logging):
    - A key event detected

      Or
    - No full data submission from vehicle in 90 days
3. Collect the required OBD data
4. Submit data via a standardized data submission format

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# Task 1 – Establish Communication with Vehicle

- Establish and maintain communication with the correct protocol to access the standardized HD OBD data
- Confirm vehicle is compliant with CARB and EPA's HD OBD regulations via information received from responding ECUs

Vehicle's OBD system

CC-Remote OBD Device

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# Task 2 – Identify When to Submit Data

- Vendors can choose to perform Task 2 at the device or their database level.

  **a) Upon detecting a key event**

  - Run a key event check within 5 minutes of every engine start
  - Key events are:
    i. Power loss of the CC-Remote OBD device
    ii. Change in MIL status
    iii. Change in Electronic identifiers of the vehicle and the OBD system (e.g., E-VIN, ECU ID, etc.)
    iv. Change in readiness profile of the OBD monitors
    v. Vehicle entered CA (optional key event parameter)

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# Task 2 – Identify When to Submit Data *(cont.)*

**Optional geofencing feature**

- Likely used by fleets that may not be active within CA every 90 days (intermittent/seasonal operation)
- CC-Remote OBD would identify if the vehicle has entered or exited CA since the last engine start through CA state geofence parameters.
- Full data submission upon entering CA
- Inform database when leaving CA
- No submission until coming back to CA

# Task 2 – Identify When to Submit Data *(cont.)*

**b) If no data submission has been received within the last 90 days**

- To check in the vehicle is operating with no emissions-related malfunctions

# Tasks 3 & 4 – Collect and submit the required OBD data

- When full data submission is triggered, device would need to collect and submit the required data.
  - OBD data required by HD OBD reg (CCR 1971.1.13) including:
    i. Vehicle and controller identifiers
    ii. Diagnostic trouble codes (DTCs)
    iii. Readiness information
    iv. Monitors support status and performance
    v. Data stream
    vi. REAL data
- Securely submit data to the HD I/M database in a standardized format.

# Recap of CC-Remote OBD System's Tasks

Vendor database

1

Communication

3

Data collection

4

Data submission to CARB HD I/M database via standardized format

CARB HD I/M database

2

Check for submission triggers

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## Next Steps

- Continue development work with interested parties
- Develop and validate the CC-Remote OBD protocol and requirement-through conducting testing and demonstrations.
- CARB seeks participation from interested telematics vendors, OEMs, and fleets to test and validate the process.

## Suggested Discussion Topics

- Considerations for incorporating the developed specifications into the existing telematics systems
- Communications between the device and vehicle
  - Possible communication issues to anticipate
  - Considerations for UDS (SAE J1979-2)
- Key event check
  - Any other item to add to the checklist?
  - Frequency and timing of the checks
  - Considerations for using the optional geofencing feature

# Thank You!

## *Open Discussion*


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CARB HD I/M webpage: https://ww2.arb.ca.gov/our-work/programs/heavy-duty-inspection-and-maintenance-program

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