

# The Role of Telematics - From Engine Development to Customer Support



Steve Trevitz

CE-CERT PEMS Conference

March 22 – 23, 2018

# Telematics

## Cellular Gateway

- Added Activity Monitor
- Vehicle OEM-Embedded

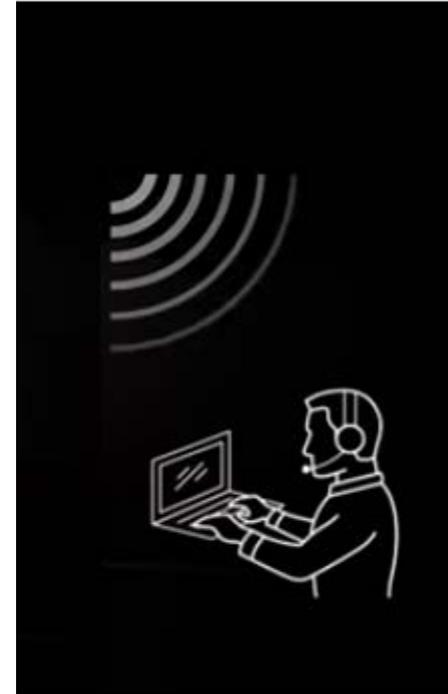


## Cellular Network

- 2G (obsolete)
- 3G
- 3G LTE
- 4G

## Not Part of This Discussion

- Satellite Systems
- Wi-Fi
- Bluetooth
- Non-Cellular Radio Freq.
- DOT-mandated ELD's



# Activity Monitor



## Measured Data from CSM MiniModules

Temperature, Pressure, Voltage, Current, Strain, RTDs, High Voltage, etc.



## Measured Data from ECM LambdaCANc Modules

Lambda, AFR, O2, Pressure



OBD2



ECM Communication from Vehicle - OBD2 & Proprietary



Encrypted Data



HDIUT (1065) - PEMS

CANSend J-1939



CAN Interface



GPS



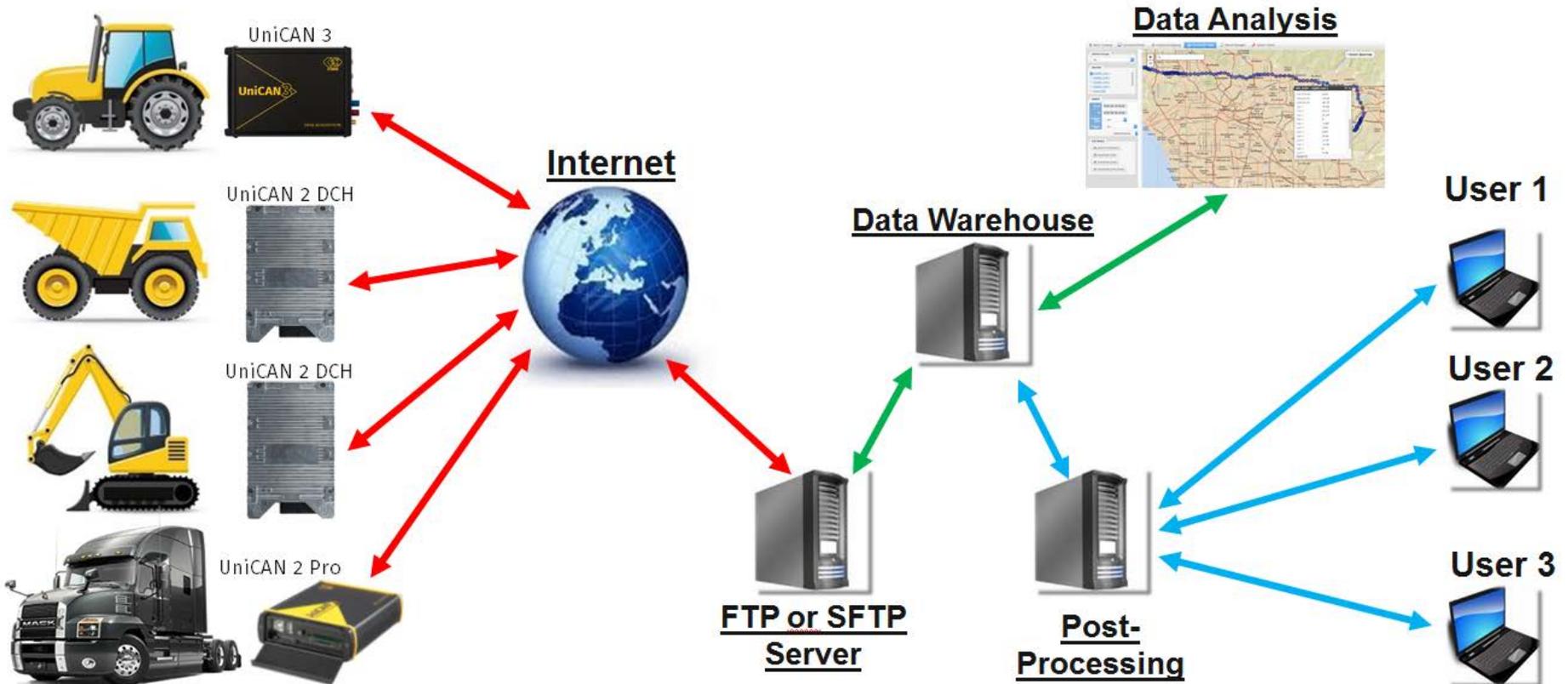
UniCAN 2 Professional Fail-Safe Data Logger  
(with OBD, encryption, and CANSend Licenses)

**CSM Products, Inc.**

# Activity Monitor



## Data Logging Concepts



CSM Products, Inc.

# Miniaturized PEMS

## No Sample Line

**ECM** ENGINE CONTROL  
AND MONITORING

miniPEMS™

## Portable Pollution Emissions Monitoring

For applications in:

- Cars
- Trucks
- Motorcycles
- Boats
- Off-road
- Trains
- and more!



Measure and Log:

- NO<sub>x</sub>
- O<sub>2</sub>
- Lambda
- NH<sub>3</sub>
- Exhaust Temp
- GPS
- and more!

# Miniaturized PEMS

## Uses Sample Line



## PRODUCT LINE UP

### parSYNC<sup>®</sup> Series

Integrated Portable Emission Measurement System (iPEMS)

#### Features of the parSYNC<sup>®</sup>:

- Replaceable PM Sensor Cartridge
- Measures PM/PN

#### Features of parSYNC<sup>®</sup> PLUS:

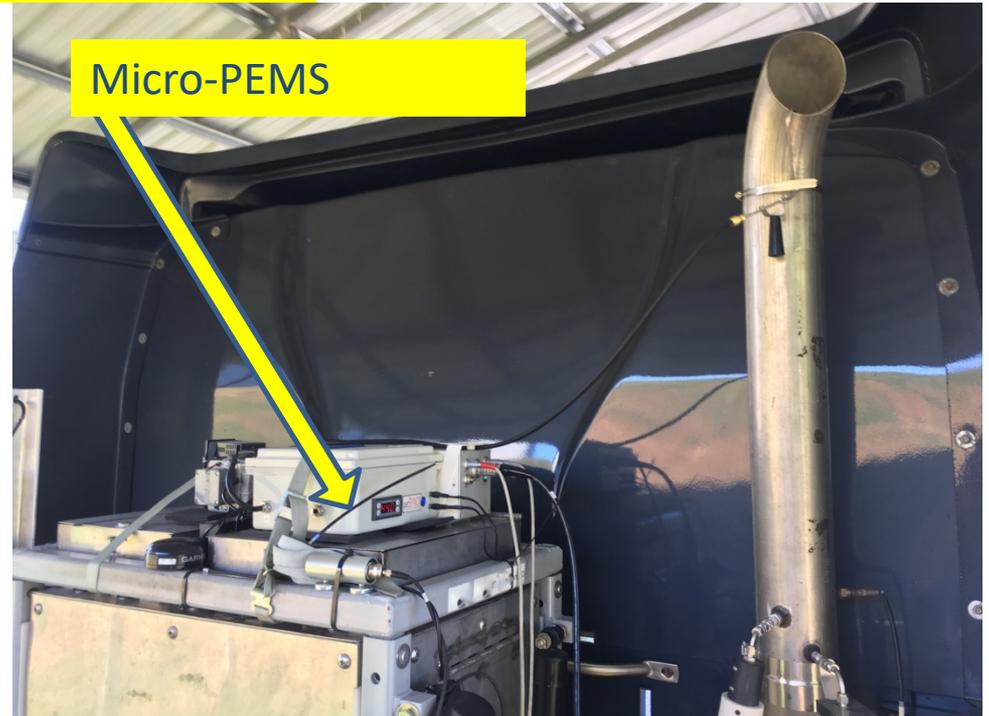
- Replaceable PM Sensor Cartridge
- Replaceable GasMOD<sup>™</sup> Cartridge
- Measures a NO, NO<sub>2</sub>, & CO<sub>2</sub>

#### Features of parSYNC<sup>®</sup> RDE:

- Replaceable PM Sensor Cartridge
- Replaceable GasMOD<sup>™</sup> Cartridge
- Measures a CO, CO<sub>2</sub>, & NO<sub>x</sub>



# Miniaturized PEMS Evaluation



Note: The 1065-PEMS is telematically observable via remote desktop connection



# PEMS Standardized Route



- Runs overnight 2<sup>nd</sup> & 3<sup>rd</sup> shift
- 1<sup>st</sup> shift for set up and shutdown of test
- Representative of real HDIUT operation
- Heavy loads / mountainous route
- Moderate loads / level interstate
- Docking maneuvers & urban bobtail

# HDIUT

## “Going Forward”

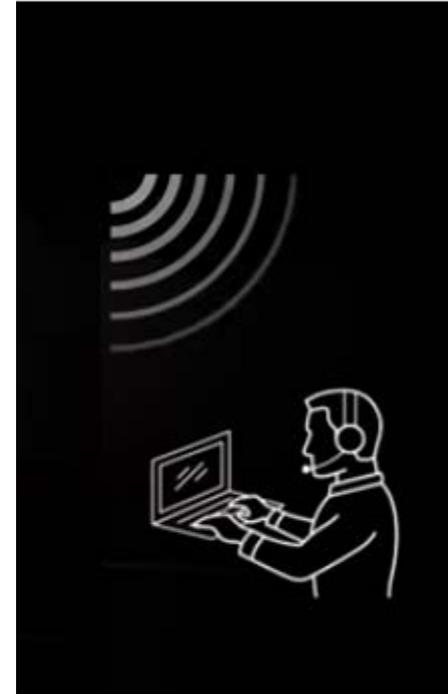
- Current regulation has many issues
- Driver is “forgotten”
  - Typically not involved in recruitment
  - Bears ultimate responsibility



# Embedded Vehicle Telematics



*Providing value  
to  
the customer!*



# Embedded Vehicle Telematics

**MACK**

Trucks

Powertrain

Technology

Buy Mack

Parts & Service

2018

VEHICLE SOFTWARE UPDATES  
DONE IN MINUTES THANKS TO  
MACK OVER THE AIR

TRI-STATE TRUCK CENTER  
NAMED MACK'S 2017 NORTH  
AMERICAN DEALER OF THE YEAR

MACK TRUCKS SUPPORTS CIM  
AUCTION WITH DONATION OF A  
MACK GRANITE MODEL

MACK TRUCKS OFFERS LOYALTY  
REWARD PROGRAM FOR NRMCA  
MEMBERS ON MACK GRANITE  
MODELS

MACK TRUCKS NOW OFFERS  
MACK GRANITE WITH INCREASED  
GROUND CLEARANCE FOR  
UNDERBODY SCRAPERS

MACK TRUCKS INTRODUCES  
ONLINE CONFIGURATOR FOR  
MACK GRANITE GRANITE MHD  
MODELS

## Vehicle Software Updates Done in Minutes Thanks to Mack<sup>®</sup> Over The Air

03-07-2018

**ATLANTA** (March 6, 2018) – Mack Trucks continues to expand its extensive suite of uptime services with the rollout of Mack<sup>®</sup> Over The Air. Mack Over The Air enables remote software updates for powertrain components and vehicle parameters for Mack trucks equipped with Mack 2017 or newer engines.

Mack gave an update of this rollout at the American Trucking Associations' Technology & Maintenance Council (TMC) annual meeting March 5–8 at the Georgia World Congress Center, Atlanta.

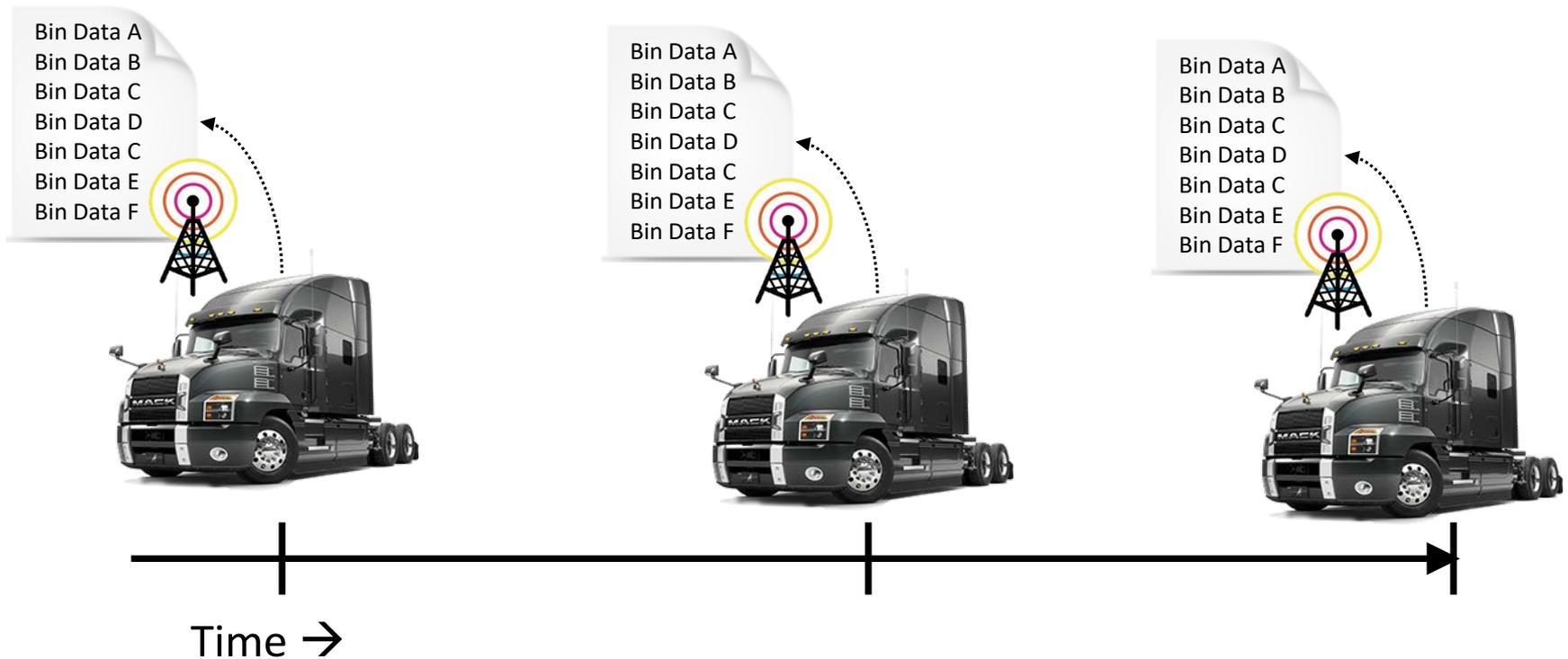
"Mack Over The Air enables customers to ensure their trucks are operating at an optimal level without disrupting their schedules in today's hypercompetitive just-in-time economy," said David Pardue, vice president of connected vehicles and uptime services for Mack Trucks. "This is just the latest step in our journey to provide industry-leading uptime for our customers."

Mack Over the Air is the newest offering in [Mack Connect](#), an uptime and productivity solution that turns data from trucks, drivers and the service process into insights to help customers run their businesses more effectively. Mack Connect combines technology like [Mack GuardDog<sup>®</sup> Connect](#) integrated telematics and the [Mack ASIST](#) service management system with the human expertise of Mack [OneCall<sup>™</sup>](#) uptime agents in Mack's 24/7 [Uptime Center](#) to keep customer trucks where they should be – on the job generating revenue.

Mack Over The Air is powered by GuardDog Connect, which also provides proactive monitoring and repair planning for 65,000 in-service Mack trucks. Mack Over The Air uses GuardDog Connect, standard on all

# Embedded Vehicle Telematics

- Telematics-equipped vehicles are now sending binned data at a set frequency:



# Embedded Vehicle Telematics



“Big Data”

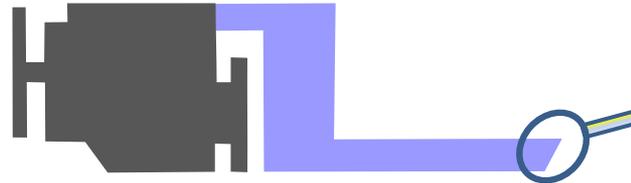
## Customer - Focused

- Vehicle Specifications
- Product Design Improvements
- Driver Coaching / Training
- Flat Logs / Trip Data
- Satisfaction Issues Resolved
- “Up-Time” Services

# Modern Compliance Concepts

The following are concepts under discussion and not formal Volvo positions

1. **Embedded Sensor-Based Tailpipe Compliance** evaluations would enable simple real-time in-use compliance assessment during powertrain development and vehicle operation



2. **Independent Miniaturized PEMS** would discourage defeat devices while enabling cost effective compliance data over-check



3. **Manufacturer Telematics Compliance Summaries** periodically submitted to regulators from manufacturer would provide engine family compliance tracking while minimizing 3<sup>rd</sup> party tampering and data ownership concerns



# Modern Compliance Simplicity

The following are concepts under discussion and not formal Volvo positions

## The following items could be simplified

- OBD
- Defect / Warranty Reporting
- Deterioration Factor Testing
- Regeneration Adjustment Factors
- In-Use Testing
- Auxiliary Emission Control Device (AECD) Description
- SCR Guidance Inducements

## Based on the following implementation

- Embedded Sensor-Based Tailpipe Compliance
- Independent Miniaturized PEMS
- Manufacturer Telematics Compliance Summaries

## Considerations

Data Privacy Rights

Cyber Security

Product Life Cycle

# Thank You!

## Acknowledgements:

CSM

ECM

3DATX

Volvo GTT

CE-CERT

